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ANALYSIS OF TRANSVERSELY ISOTROPIC LAMINATED CYLINDERS UNDER AXISYMMETRIC MECHANICAL AND THERMAL LOADS

Jonas A. Zukas

Ballistic Research Laboratories Aberdeen Proving Ground, Maryland

November 1969



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U.S. ARMY ABERDEEN RESEARCH AND DEVELOPMENT CENTER BALLISTIC RESEARCH LABORATORIES ABERDEEN PROVING GROUND, MARYLAND

BALLISTIC RESEARCH LABORATORIES REPORT NO. 1457

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ANA LYSIS OF TRANSVERSE LY ISOTROPIC LAMINATED CYLINDERS UNDER AXISYMMETRIC MECHANICAL AND THERMAL LOADS

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Terminal Ballistics Laboratory

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ABSTRACT

A theory for the analysis of stresses in laminated circular cylindrical shells subjected to arbitrary axisymmetric mechanical and thermal loadings has been developed. This theory, specifically for use with pyrolytic graphite type materials, differs from the classical thin shell theory in that it includes the effects of transverse shear deformation and transverse isotropy, as well as thermal expansion through the shell thickness.

Solutions in several forms are developed for the governing equations. The form taken by the solution function is governed by geometric considerations. A range in which the various solution forms occur was determined numerically.

As a sample problem, the slow cooling of pyrolytic graphite deposited onto a commercial graphite mandrel was considered. Investigation of normal and shear stress behavior at the pyrolytic graphite - mandrel interface showed that these stresses decrease in magnitude with increasing E/G_c ratio and increasing deposit to mandrel thickness (h_a/h_b) ratio. This implies that a thin mandrel and a material weak in shear are desirable to minimize the possibilities of flaking and delamination of the pyrolytic graphite.

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NOTATION .

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| a, b | subscripts indicating upper or lower lamina |
|-----------------------------------|---|
| a _{ij} , b _{ij} | constants defined by equations (C.2) and (C.3) |
| A,B | constants defined by (C.8) |
| c | preferred direction in a transversely isotropic material |
| c _i | roots of equation (22) defined by (C.11) and (C.13) |
| c _i | $\frac{E_i h_i}{1 - v_i^2} (i = a, b)$ |
| D _i | $\frac{E_{i}h_{i}^{3}}{12(1-v_{i}^{2})}$ |
| D | d/dx |
| e | natural base |
| E, E _c | Young's Modulus in the plane of isotropy and "c" direction |
| | respectively |
| Gc | shear modulus relating stress and strain across the plane |
| | of isotropy $(=G_{XZ} = G_{\theta Z} = G_{ZX} = G_{Z\theta})$ |
| gi | constants defined by equation (C.4) |
| ha, hb | individual lamina thicknesses |
| h | h _a + h _b |
| 1, j | subscripts |
| kj | constants defined by equation (C.6) |
| m, n | constants defined by equation (C.7) |
| m | constant defined by (11a) |
| M. Ma | stress couples |

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| ^M Tx, ^M Tθ | thermal couples ' |
|-----------------------------------|---|
| M | defined by equation (41) |
| N _x , N _e | stress resultants |
| N _{Tx} , N _{T0} | thermalresultants defined by equation (41) |
| P11 | $\sigma_{z} (h_{i}/2) (i = a,b)$ |
| P ₂₁ | $\sigma_{z}(-h_{i}/2)$ (i = a,b) |
| p(x) | $p_{1a} - p_{2b}$ |
| Pj | joint normal stress $(=\sigma_z (-\frac{a}{2}) = \sigma_z (+\frac{b}{2})$ |
| Q _i | shear resultant |
| হ | defined by equation (41) |
| R | Radius to shell reference surface |
| Т | temperature measured from the stress-free temperature |
| | of the material |
| u _x , u _z | deflections in the "x" and "z" directions respectively |
| uo _i | axial deflection of lamina middle surface |
| uŧ | virtual displacement of shell middle surface |
| ۷i | radial displacement of lamina middle surface |
| w ₁ | $\int_0^z (\alpha_c T)_i dz (i = a, b)$ |
| w# | virtual radial displacement of lamina middle surface. |
| x | axial coordinate for cylindrical shell |
| 2 | cylindrical coordinate |
| a,a _C | thermal expansion coefficients in the "x" and "z" directions |
| | respectively |

| β | rotation of the normal to the undeformed lamina middle |
|--|---|
| · | surface due to deformation |
| Γ | defined by equation (C.10) |
| λ ₁ , λ ₂ , λ ₃ | defined by equation (C.9) |
| ¢ ₽i | virtual rotation |
| Δ _i | defined by equation (21) |
| e i i | strain component |
| v | Poisson's ratio in the x - θ plane ($v_{x\theta} = v_{\theta x}$) |
| .v c | Poisson's ratio (ν _{xz} = ν _{θz}) |
| ^v ij | Poisson's ratio defined as the negative of the ratio of the |
| | strain in the j-direction to the strain in the i-direction |
| | due to a stress in the i-direction |
| σij | stress component |
| τ _j | joint shear stress (= σ_{zx} (- $h_a/2$) = σ_{zx} (+ $h_b/2$) |
| θ | cylindrical coordinate in the circumferential direction |
| θ ₁ , θ ₂ | defined by equation (C.10) |
| ()* | $\frac{d}{dx}$ () |
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I. INTRODUCTION

The ever- expanding missile and space technology continually demands materials capable of maintaining structural integrity at very high temperatures. Of late, attention has been focused on refractory materials, their anisotropy in physical and mechanical properties making them ideally suited for a wide range of insulation and/or structural applications.

Of the many refractory materials possible, pyrolytic graphite (PG) has probably received the most attention of late although it was known to Edison (1)* in 1883 who described methods for its manufacture, the technique involving formation of carbon deposits onto substrates heated in carbon-containing gases. For structural use, pyrolytic graphite is generally deposited at temperature from 3500°F to 4000°F in a stream of hydrocarbon gas, such as methane, onto a substrate of commercial graphite maintained at temperatures of 1500°F to 5000°F. The rate at which the material is produced depends on a number of factors which include the temperature, the reaction pressure, the hydrocarbon flow rate and

*Numbers in parenthesis indicate corresponding references in the bibliography

the surface to volume ratio of the substrate surface (2), (3), (4), (5). X-ray analysis of the resultant deposit shows a wellcrystallized structure having much in common with the single graphite crystal (6). Growth is always normal to the substrate surface and after a thickness of 0.1" - 0.5" is reached, the deposition process is stopped and the deposit allowed to cool for several weeks.

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The result of such a formation process is a material highly anisotropic in physical properties. The PG has one plane of isotropy parallel to the mandrel surface $(x, \theta \text{ direction} -- \text{ see}$ figure II-1 for geometry) and a single preferred direction (z), a state commonly referred to as transverse isotropy. With thermal conductivity between 100 and 1000 times greater in the (x, θ) direction than in the (z) direction, the material acts as an excellent conductor along its surface but also as a good insulator in the thickness (z) direction. The coefficient of thermal expansion in the (z) direction is from 10 to 30 times greater than that in the plane of isotropy (x, θ) so that thermal expansion through-the-thickness must be considered in many analyses of the material's thermal behavior.

Other curious effects due to the anisotropy are manifest in the Poisson's ratio which is negative in the plane of isotropy $(v_{xA} = v_{BX} = -0.21)$ but large and positive in the preferred direction

 $(v_{xz} = v_{\theta z} = +0.9)$. Furthermore, the ratio of the elastic modulus in the isotropic plant to the shear modulus in the transverse plane $(E_x/G_{xz} \text{ or } E_{\theta}/G_{\theta z})$ may range from 20 to 50, compared to an E/G ratio of 2.5 for an isotropic material with v = 0.25. Therefore, in an analysis of a structure composed of such material, transverse shear deformation even for thin cross-sections must be considered.

t

Thermal and mechanical properties can be found readily (2), (5), (7), (8), (9), (10), (11), (12). Typical properties, given in Table I-1, are taken from (10), which are reasonably close to those given in other references, discrepancies most probably being due to variations in the deposition process.

Among the earliest analyses of structures of pyrolytic materials were those of Garber (13) and Levy (14) who treated thermal stresses in cylindrical and spherical shells and also the residual stresses caused by the general anisotropy of pyrolytic graphite, but neglected transverse shear deformation and did not account for the high thermal expansion coefficient in the (z) direction. McDonough (15) has considered thermal stresses in shells of revolution of pyrolytic graphite type materials subjected to axially symmetric loads, including transverse shear deformation and thermal expansion through the thickness. He was able to show that neglect of transverse shear deformation would lead to an over-estimate of the stiffness coefficient

TABLE I-1 PHYSICAL PROPERTIES OF PYROLYTIC GRAPHITE

MECHANICAL PROPERTIES

1. Young's Modulus (PSI)

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| TEMP | (x, θ) Direction | (z) Direction |
|--------|-------------------------|----------------------|
| 70°F. | 5.4×10 ⁶ | 1.5 ×10 ⁶ |
| 1000°F | 4.3x10 ⁶ | 1.29×10 ⁶ |
| 2000°F | 3.5×10 ⁶ | 1.05×10 ⁶ |
| 3000°F | 2.7×10 ⁶ | 0.81×10 ⁶ |

2. Poisson's Ratio

70°F $v_{x\theta} = 0.21$ $v_{xz} = 0.90$

THERMAL PROPERTIES

| 1. | Thermal Expansion | in/in - ^O F | |
|----|-------------------|------------------------|-----------------------|
| | 70°F | 0.0 | 13.1×10 ⁻⁶ |
| | 1000°F | 0.6×10 ⁻⁶ | 13.1×10 ⁻⁶ |
| | 2000°F | 1.2×10 ⁻⁶ | 13.1x10 ⁻⁶ |
| | 3000°F | 1.7×10 ⁻⁶ | 13.1x10 ⁻⁶ |

| 2. | Conductivity, BTU/hr-ft- ⁰ F | | | |
|----|---|-------|------|--|
| | 70°F | 290.0 | 1.25 | |
| | 1000°F | 165.0 | 0.82 | |
| | 2000°F | 100.0 | 0.60 | |
| | 3000°F | 60.0 | 0.60 | |

for properties representative of PG while excluding thermal expansion in the (z) direction leads not only to erroneous stress predictions but that even the sign of the stress (tension or compression) may be wrong. Kliger (16), (17) has extended McDonough's work for the case of conical shells in that he derives equations for non-axially symmetric mechanical and thermal loadings. Raju (18) studied the case of shallow shells of pyrolytic graphite type materials subjected to a variety of axially symmetric and non-axially symmetric loads. Daugherty (19), (20) treated the case of non-circular cylindrical shells of pyrolytic materials.

1

The preceding deal with single-layer shells. Anisotropic laminated shells of revolution with elastic properties symmetric about the middle surface of the composite shell are extensively treated by Ambartsumian (21), whereas Dong (22), (23), et al (24) treat layered shells wherein the structure is assumed to be composed of an arbitrary numbers of bonded layers each of different constant thickness, different orientation of elastic axes and different anisotropic elastic properties. Since Dong does not assume elastic symmetry about the middle surface, flexural and extensional deformations are coupled and solution techniques for homogeneous shells do not carry over directly for anisotropic elastic shells. Hence, alternate methods of solution are developed.

Radkowski et al (25) considered laminated isotropic shells of revolution with variable thickness using E. Reissner's for-

formulation (26). Radkowski extended this work to include variable laminated orthotropic material properties (27). Both formulations were restricted to axisymmetric loads. In Radkowski's works and that of Sepetoski (28), the governing equations were cast in finite difference form and solved with the aid of a digital computer. The introduction to Dong's paper (23) makes interesting reading regarding the hazards of this perfectly valid technique.

Other treatments of laminated cylinders have been by Jones and Whittier (29), Tsai and Azzi (30), Paul (31), Au (32), Keeffe and Windholz (33), These, and most other references cited herein are characterized by neglect of transverse shear deformation. A recent work of great theoretical elegance, even though it neglects transverse shear deformation, is that of Zudans (34) which presents a theory for arbitrarily loaded (mechanically & thermally) shells of revolution with internal masses and ring stiffeners, derived under the Kirchoff Hypothesis and consistent with balance of energy as well as linear and angular momentum and invariance under transformation of middle surface coordinate systems and rigid body displacements. The elegance, unfortunately, does not carry over to the computational techniques (35).

Laminated isotropic plates have been considered by Vinson (36) who treated thermal stresses in circular plates, neglecting transverse shear deformation. Summers (37) treats thick and thin isotropic and orthotropic laminated plates including transverse shear deformation.

Mehta (34) considers orthotropic and isotropic laminated as well as single-layered rectangular plates of pyrolytic graphite type materials under static mechanical and thermal loads. Wu (39), (40), and (41) treats the lateral vibrations of both small and large amplitude for rectangular plates of pyrolytic and graphite materials.

Except for those references dealing with pyrolytic graphite type materials, all the works reviewed which analyze multi-layered structures are characterized by their neglect of either transverse shear deformation or thermal expansion through-the-thickness or both.

Prompted by the absence of a definitive treatment of laminated shells applicable to pyrolytic graphite type materials, this thesis was undertaken. It is an extension of "AcDonough's work in that layered cylindrical shells, including the effects of transverse shear deformation and thermal expansion through-thethickness, subjected to arbitrary axi-symmetric loading are considered.

II. DERIVATION OF GOVERNING EQUATIONS

The coordinate system used is shown in Figure (II-1). The three-dimensional equations of thermoelasticity (uncoupled) for the case of axial symmetry are given by:

Stress-Strain Relations (transversely isotropic material)

$$\varepsilon_{\chi} = \frac{1}{E} (\sigma_{\chi} - \nu \sigma_{\theta} - \frac{V}{C} \sigma_{z}) + \alpha T$$

$$\varepsilon_{\theta} = \frac{1}{E} (\sigma_{\theta} - \nu \sigma_{\chi} - \nu_{c} \sigma_{z}) + \alpha T$$

$$\varepsilon_{z} = \frac{\sigma_{z}}{E_{c}} - \frac{\nu_{c}}{E} (\sigma_{\chi} + \sigma_{\theta}) + \alpha_{c} T$$

$$\varepsilon_{\chi z} = \frac{\sigma_{\chi z}}{2G_{c}}$$
(1)

where $\varepsilon_{\mathbf{X}\theta} = \varepsilon_{\theta \mathbf{Z}} = \sigma_{\mathbf{X}\theta} = \sigma_{\theta \mathbf{Z}} = 0$ by symmetry

 ϵ_{ij} and σ_{ij} are the physical components of the strain and stress tensors respectively, and for brevity $\sigma_{ij} = \sigma_i$ when i = j. E, E_c , v_2 , v_c , G_c are five independent elastic constants where again for brevity $v = v_{\chi\theta} = v_{\theta\chi}$ and $v_c = v_{\chi Z} = v_{\theta Z}$. α , α_c are the coefficients of thermal expansion in the x and z directions of the materials. T is the temperature measured from the stress-free temperature of the material in units consistent with the α 's.



The preferred direction for the material is everywhere coincident with the z coordinate. This restriction is carried throughout this work.

Equilibrium Equations

The equilibrium equations when applied to the present problem become for each lamina:

$$R(1 + \frac{z}{R}) \frac{\partial \sigma_{x}}{\partial x} + R(1 + \frac{z}{R}) \frac{\partial \sigma_{xz}}{\partial z} + \sigma_{xz} = 0$$

$$R(1 + \frac{z}{R}) \frac{\partial \sigma_{z}}{\partial z} + R(1 + \frac{z}{R}) \frac{\partial \sigma_{xz}}{\partial x} + \sigma_{z} - \sigma_{\theta} = 0$$
(2)

The third equation is identically zero from symmetry considerations.

Strain-Deformation Equations

The strain-deformation relations can be written correspondly as:



 $u_A \equiv 0$ by symmetry

(3)

The displacements are positive in the direction of the positive corresponding coordinate (See Figure II-1).

Assumptions:

1. The thickness of the shell is small compared with other dimensions, hence Love's First Approximation is applicable:

i.e.
$$\frac{h}{R} \ll 1$$
 (4)

1

2. The displacements are small compared to the thickness of the shell and the angles of rotation are small compared to unity.

3. The transverse normal stress is small compared with other normal stress components and is neglected in the stress-strain equations.

4. A linear element normal to the undeformed middle surface undergoes translation and rotation and remains straight, implying deformations of the form

$$u_{y} = u_{0}(x) + z_{\beta}(x)$$
 (5)

5. Transverse normal strain due to thermal expansion will be included, that due to mechanical (or isothermal) loads will be neglected.

This implies a deformation of the form

$$u_{z}(x,z) = w(x) + \overline{w}(x,z)$$
(6)

where

$$\overline{w}(x,z) = \int_{0}^{z} \alpha_{c} T dz$$

Material properties are constant for each lamina.
 With these assumptions, the equation (1) becomes:

$$\varepsilon_{X} = \frac{1}{E} (\sigma_{X} - \nu \sigma_{\theta}) + \alpha T$$

$$\varepsilon_{\theta} = \frac{1}{E} (\sigma_{\theta} - \nu \sigma_{X}) + \alpha T_{r}$$
(7)
$$\varepsilon_{Z} = \alpha_{c} T$$

$$\varepsilon_{XZ} = \frac{\sigma_{XZ}}{2G_{r}}$$

Making use of equations (5) and (6) and neglecting z/R in comparison to unity, the equations (3) become:

(8)

$$\varepsilon_{X} = u_{0}^{*} + z\beta^{*}$$

$$\varepsilon_{\theta} = \frac{1}{R} (w + \overline{w})$$

$$\varepsilon_{z} = \frac{\partial \overline{w}}{\partial z}$$

$$\varepsilon_{xz} = \frac{1}{2}(\beta + w^{*})$$

where () $r = D () = \frac{d}{dx} ()$

The stress resultants and couples are defined as follows:





(9)









i = a, b

The equilibrium equations in terms of stress resultants and couples are readily obtained. Integrating (2) directly yields

$$N'_{x_{i}} + \tau_{1i} - \tau_{2i} = 0$$

$$M'_{x_{i}} - Q_{i} + \frac{h_{i}}{2} \tau_{1i} + \frac{h_{i}}{2} \tau_{2i} = 0$$

$$Q'_{i} - \frac{N_{\theta i}}{R_{i}} + P_{1i} - P_{2i} = 0$$

(10)

i = a,b

Solving equations (7) for normal stresses, first integrating them from $-h_i/2$ to $+h_i/2$; then multiplying through the equations by z and integrating once again between the same limits, making use of the definitions of the stress resultants and couples (9) and simplifying, the following stress-strain relations result:

$$N_{x_{i}} = \frac{E_{i}h_{i}}{(1-v_{i}^{2})} (u_{01}^{\prime} + \frac{v_{i}W_{i}}{R_{i}}) - \frac{N_{Tx_{1}}}{1-v_{1}} + \frac{E_{i}v_{1}}{R_{i}(1-v_{i}^{2})} \int_{-h_{i}}^{h_{i}} \overline{w}_{i}dz$$

$$N_{\theta_{i}} = \frac{E_{i}h_{i}}{(1-v_{i}^{2})} (v_{i}u_{01}^{\prime} + \frac{W_{i}}{R_{i}}) - \frac{N_{T\theta_{i}}}{1-v_{i}} \pm \frac{E_{i}}{R_{i}(1-v_{i}^{2})} \int_{-h_{i}}^{h_{i}} \overline{w}_{i}dz$$

$$M_{x_{i}} = \frac{E_{i}h_{i}^{3}}{12(1-v_{i}^{2})} \beta_{i} - \frac{M_{Tx_{i}}}{1-v_{i}} \pm \frac{E_{i}v_{i}}{R_{i}(1-v_{i}^{2})} \int_{-h_{i}}^{h_{i}} z\overline{w}_{i}dz$$
(11)

ì

$$Me_{i} = \frac{E_{i}h_{i}^{3}}{12(1-v_{i}^{2})}^{\beta}_{i} - \frac{M_{T\theta_{i}}}{1-v_{i}} + \frac{E_{i}}{R_{i}(1-v_{i}^{2})} \int_{-h_{i}}^{n_{i}} z\overline{w_{i}}dz$$

1 = a, b

An integrated shear stress strain equation is required in addition to (11). The necessary expression is obtained using weighted integration, the procedure being analogous to that in reference 15, and for convenience given in Appendix D.

$$Q_{i} = \frac{\overline{m}_{i}}{6} + \frac{5}{6} h_{i} G_{c}^{i} (\beta_{i} + w_{i}) + \Delta_{i}$$
where $\overline{m}_{i} = \frac{h_{i}}{2} (\tau_{1i} + \tau_{2i})$ (11A)

Solving for Q_a and Q_b from the second of the integrated equilibrium equations (10) and substituting into the third, making use of M_{x_i} and N_{θ_i} from (11) and the definitions

$$C_i = \frac{E_i h_i}{(1 - v_i^2)}$$
; $D_i = \frac{E_i h_i^3}{12(1 - v_i^2)}$ (i = a, b)

$$\tau_{j} = \sigma_{zx} \left(-\frac{h_{a}}{2} \right) = \sigma_{zx} \left(+\frac{h_{b}}{2} \right)$$
$$P_{j} = \sigma_{z} \left(-\frac{h_{a}}{2} \right) = \sigma_{z} \left(+\frac{h_{b}}{2} \right)$$

two useful relations are obtained:

$$D_{a}D^{3}B_{a} - \frac{C_{a}v_{a}h_{a}}{2R_{a}} D_{B}_{a} - \frac{C_{a}v_{a}h_{b}}{2R_{a}} D_{B}_{b} + \frac{h_{a}}{2} D_{\tau}_{j} - P_{j} - \frac{C_{a}v_{a}}{R_{a}} D_{u}_{0}_{b} - \frac{C_{a}}{2R_{a}} w_{b}$$

$$= \frac{a}{17} + \frac{\pi}{1}$$
(12)

$$D_{b}D^{3}\beta_{b} + \frac{h_{b}}{2}D\tau_{j} + p_{j} - \frac{C_{b}v_{b}}{R_{b}}Du_{0_{b}} - \frac{C_{b}}{R_{b}^{2}}w_{b} = \alpha_{27} + \pi_{2}$$
(13)

Note that in the above, use has been made of the conditions that the laminae are bonded together and that no slippage occurs in the joints between laminae. The former is given by

$$u_{z}(\frac{-h_{a}}{2}) = u_{z}(\frac{h_{b}}{2}) \text{ which implies that } \overline{w}_{a}(x, \frac{-h_{a}}{2}) + w_{a} = \overline{w}_{b}(x, \frac{h_{b}}{2}) + w_{b}$$

or $w_{a} = w_{b} + \overline{w}_{b}(x, \frac{h_{b}}{2}) - \overline{w}_{a}(x, \frac{-h_{a}}{2})$
 $= w_{b} + \hat{E}$ (14)

where $\hat{E} = \overline{w}_b(x, \frac{h_b}{2}) - \overline{w}_a(x, -\frac{-h_a}{2})$.

The latter condition is expressed by

$$u_{x}(\frac{-n_{a}}{2}) = u_{x}(\frac{n_{b}}{2})$$

$$u_{o_{a}} - \frac{h_{a}}{2} \beta_{a} = u_{o_{b}} + \frac{h_{b}}{2} \beta_{b}$$

$$u_{o_{a}} = u_{o_{b}} + (\frac{h_{a}}{2} \beta_{a} + \frac{h_{b}}{2} \beta_{b})$$
(15)

Making use of (11), (14) and (15) in the first integrated equilibrium equation, two further relations are obtained:

$$\frac{C_{a}h_{a}}{2}D^{2}\beta_{a} + \frac{C_{a}h_{b}}{2}D^{2}\beta_{b} - \tau_{j} + C_{a}D^{2}u_{o_{b}} + \frac{C_{a}\nu_{a}}{R}Dw_{b} = \alpha_{37} + \pi_{3}$$
(16)

$$\tau_{j} + C_{b}D^{2}u_{0} + \frac{C_{b}v_{b}}{R_{b}}Dw_{b} = \alpha_{47} + \pi_{4}$$
(17)

Using (11A) and the second of the integrated equilibrium equations together with (14) and (15), two final relations are obtained:

$$D_{a}D^{2}_{\beta}_{a} - \frac{5}{6}G^{a}_{c}h_{a}_{\beta}_{a} + \frac{5}{12}h_{a}_{\tau}_{j} - \frac{5}{6}G^{a}_{c}h_{a}Dw_{b} = \alpha_{57} + \pi_{5}$$
(18)

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$$D_{b}D^{2}_{\beta_{b}} - \frac{5}{6}G_{c}^{b}h_{b}\beta_{b} + \frac{5}{12}h_{b}\tau_{j} - \frac{5}{6}G_{c}^{b}h_{b}Dw_{b} = \alpha_{67} + \pi_{6}$$
(19)

where in the above

40. 1

$${}^{\alpha}17 = \frac{{}^{N}T\theta_{a}}{R_{a}^{(1-\nu_{a})}} - \frac{C_{a}\hat{E}}{R_{a}^{2}} - \frac{E_{a}}{R_{a}^{2}(1-\nu_{a}^{2})} \int_{-\frac{h_{a}}{2}}^{\frac{H_{a}}{2}} \overline{w}_{a} dz$$

+
$$D^2 \left\{ \frac{M_{Tx_a}}{1-v_a} - \frac{E_a v_a}{R_a (1-v_a^2)} \right\} \int_{-h_a}^{\frac{H_a}{2}} z \overline{w}_a dz \right\}$$

$$\begin{aligned} a_{27} &= \frac{N_{Te_{b}}}{R_{b}(1-v_{b})} - \frac{E_{b}}{R_{b}^{2}(1-v_{b}^{2})} \int_{-\frac{h_{b}}{2}}^{\frac{h_{b}}{2}} \overline{w_{b}} dz \\ &+ D^{2} \left\{ \frac{M_{Tx_{b}}}{1-v_{b}} - \frac{E_{b}v_{b}}{R_{b}(1-v_{b}^{2})} \int_{-\frac{h_{b}}{2}}^{\frac{h_{b}}{2}} z \overline{w}_{b} dz \right\} \\ a_{37} &= D \left\{ \frac{N_{Tx_{a}}}{1-v_{a}} - \frac{C_{a}v_{a}}{R_{a}} \hat{E} - \frac{E_{a}v_{a}}{R_{a}(1-v_{a}^{2})} \int_{-\frac{h_{a}}{2}}^{\frac{h_{a}}{2}} \overline{w_{a}} dz \right\} \\ a_{47} &= D \left\{ \frac{N_{Tx_{b}}}{1-v_{b}} - \frac{E_{b}v_{b}}{R_{b}(1-v_{b}^{2})} \int_{-\frac{h_{b}}{2}}^{\frac{h_{b}}{2}} \overline{w_{b}} dz \right\} \\ a_{57} &= \Delta_{a} + D \left\{ \hat{E} + \frac{M_{Tx_{a}}}{1-v_{a}} - \frac{E_{a}v_{a}}{R_{a}(1-v_{a}^{2})} \int_{-\frac{h_{a}}{2}}^{\frac{h_{a}}{2}} z \overline{w_{a}} dz \right\} \\ a_{67} &= \Delta_{b} + D \left\{ \frac{M_{Tx_{b}}}{1-v_{b}} - \frac{E_{b}v_{b}}{R_{b}(1-v_{b}^{2})} \int_{-\frac{h_{b}}{2}}^{\frac{h_{b}}{2}} z \overline{w_{b}} dz \right\} \end{aligned}$$

(20)

with

$$\pi_{1} = -p_{1a} - \frac{h_{a}}{2} D\tau_{1a}$$

$$\pi_{2} = +p_{2b} - \frac{h_{b}}{2} D\tau_{2b}$$

$$\pi_{3} = -\tau_{1a}$$

$$\pi_{4} = +\tau_{2b}$$

$$\pi_{5} = -\frac{5}{12} h_{a}\tau_{1a}$$

$$\pi_{6} = -\frac{5}{12} h_{b}\tau_{2b}$$

$$(21)$$

$$\Delta_{i} = \frac{5}{4} \int_{-\frac{h_{i}}{2}}^{\frac{h_{i}}{2}} \left\{ G_{c}^{i} \overline{w}_{i}^{\prime} - (\frac{2z}{h_{i}})^{2} \left[G_{c}^{i} \overline{w}_{i}^{\prime} - \frac{1}{R} \int_{-\frac{h_{i}}{2}}^{z} dy \right] \right\} dz \quad (i = a, b)$$

The governing equations may be transformed to a more useful form for solution. Since they are cumbersome for manipulation in their present form, a matrix notation was used to define the coefficients of the unknowns. These are tabulated in Appendix C. After some manipulation of the governing equations, the following are obtained:

$$(g_1 D^7 + g_2 D^5 + g_3 D^3 + g_4 D) w = L_1(x)$$
 (22)

$$(b_{11}D^4 + b_{12}D^2 + b_{13}) \beta_b = L_{II}(x) - (b_{14}D^3 + b_{15}D) w_b$$
 (23)

$$a_{23}D_{a}^{\beta}^{2} + L_{III}(x) - (a_{21}D_{.}^{2} + a_{22})_{b}^{\beta} - a_{24}D_{b}^{w}$$
 (24)

$$D^{2}u_{0b} = L_{IV} (x) - k_{1}D^{2}\beta_{a} - k_{2}D\beta_{b} - k_{3}Dw_{b}$$
(25)

$$\tau_{j} = L_{V} (x) - k_{4} D^{2} u_{ob} - k_{5} D w_{b}$$
 (26)

$$P_{j} = L_{VI}(x) - k_{6}D^{3}_{Bb} - k_{7}D\tau_{j} + k_{8}Du_{0b} + k_{q}w_{b}$$
(27)

III. SOLUTION OF GOVERNING EQUATIONS

Homogeneous Solution:

Consider first W_b . Assuming a solution of the form $W_b = e^{Sx}$ and letting $y = s^2$, (22) then takes the form $y^3 + \frac{g_2}{g_1}y^2 + \frac{g_3}{g_1}y + \frac{g_4}{g_1} = 0$ (28)

for the homogeneous solution.

The solution of equations in the form (28) is developed in reference (42) and leads to three possibilities for the roots:

<u>Case 1:</u> there are two conjugate imaginary roots and one real root

- .Case 2: there are three real and unequal roots
- <u>Case 3</u>: there are three real roots of which at least two are equal.

Case 1 leads to a solution of (22) which is of the form $W_{bH} = V_1 e^{C_1 X} + V_2 e^{-C_1 X} + e^{C_2 X} (V_3 \cos c_3 X + V_4 \sin c_3 X)$

+ $e^{-c_2 x} (V_5 \cos c_3 x + V_6 \sin c_3 x)$ (29)

where $V_1 - V_6$ are constants to be evaluated through boundary conditions. The constants $c_1 - c_3$ are defined in Appendix C.

The Case 2 solution can take on several forms depending on wether the roots of (28) are positive or negative. The final forms for the case of one, two and three positive real roots respectively, are:

$$W_{bh} = V_1 e^{C_4 x} + V_2 e^{-C_4 x} + V_3 \cos c_5 x + V_4 \sin c_5 x$$

$$+ V_5 \cos c_6 x + V_6 \sin c_6 x \qquad (30)$$

$$W_{bH} = V_1 e^{C_4 x} + V_2 e^{-C_4 x} + V_3 e^{C_5 x} + V_4 e^{-C_5 x}$$

$$+ V_5 \cos c_6 x + V_6 \sin c_6 x \qquad (31)$$

$$W_{bH} = V_1 e^{C_4 x} + V_2 e^{-C_4 x} + V_2 e^{C_5 x} + V_4 e^{-C_5 x}$$

+
$$V_5 e^{C_6 x} + V_6 e^{-C_6 x}$$
 (32)

where, again, the $V_1 - V_6$ are boundary value_constants and $c_4 - c_6$ are defined in Appendix C.

Case 3 represents the degenerate forms (30) - (32) where two of the roots are equal. The equations then take the form:

 $W_{bH} = V_1 e^{C_4 x} + V_2 e^{-C_4 x} + (V_3 + V_5 x) \cos c_5 x + (V_4 + V_6 x) \sin c_5 x \quad (33)$

$$W_{bH} = (V_1 + V_3 x)e^{C_4 x} + (V_2 + V_4 x)e^{-C_4 x} + V_5 \cos c_6 x$$

$$+ V_6 \sin c_6 x$$
(34)

$$W_{bH} = (V_1 + V_3 x)e^{C_4 x} + (V_2 + V_4 x)e^{-C_4 x} + V_5 e^{C_6 x} + V_6 e^{-C_6 x}.$$
(35)

In treating single-layered cylinders, it is possible to write the $c_1 - c_6$ explicitly in terms of the physical quantities

involved and thus have a feel for the physical behavior of the shell. In the present derivation, however, these expressions are so lengthy and involved that, unless one has a specific example in mind, their explicit form for the general case is of dubious utility. A point is reached where one must decide whether to obscure the physical situation with mathematics or obscure the mathematics with the physical quantities involved. The former course was chosen to show where the mathematical formulation is analogous to that for the single-layered cylinder (Case 1) and where it diverges (Cases 2 and 3). To import greater physical significance to the equations it becomes necessary to either consider a specific case and determine the form and constants listed in Appendix C will take or resort to numerical evaluation of the constants.

Consider next equation (25). This may be integrated directly to give $U_{ob} = \iint L_{IV} (x) dxdx - k_1^{\beta} a - k_2^{\beta} b - k_3 \int w_b dx + V_7 x + V_8$ (36)

where V_7 and V_8 are also boundary value constants. Since there are also eight boundary conditions, four at each edge, it follows that the homogeneous solutions for the remaining unknowns β_a and β_b are not required. Their particular solutions will suffice to satisfy the governing equations. This is equivalent to setting the boundary value constants of the β_a and β_b homogeneous solutions to zero.

Total Solution:

The total solution will consist of the homogeneous solutions given in the previous section together with whatever particula[¬] solutions are called for due to the mechanical and thermal loading for any given problem. Total solutions for displacements will take the form:

$$W_{b}(x) = W_{bH} + W_{b} part$$
(37)

$$\beta_{b}(x) = \beta_{b} \underline{part}$$
(38)

$$\beta_a(x) = \beta_a \underline{part}$$
(39)

where
$$W_b part$$
 is the particular solution of (22) due to $L_I(x)$, and
 $\beta_b part$ is the particular solution of (23) due to $L_{II}(x)$ -
 $(b_{14}D^3 + b_{15}D)W_b(x)$, and

$$B_{a part}$$
 is the particular solution of (24) due to $L_{III}(x) - (a_{21}D^2 + a_{22})g_b(x) - a_{24}DW_b(x)$.

Once (37) - (39) are known, u_{ob} may be found from (36) and the joint shear and normal stresses from (26) and (27) respectively.

IV. BOUNDARY CONDITIONS

Boundary conditions for plates and shells are listed in many sources (21), (34), (37), (36), (37). For the axi-sym metric case, they are usually stated as:

At the edges x = 0 and x = L

either u or N prescribed either w or Q prescribed either β or M prescribed

For multilayered problems, the same boundary conditions usually apply if N, M and Q are interpreted as resultants N, 'M, Q. Considering a two-layered cylinder for example, laminas a and b, the resultants would be:

(40)

 $\overline{N} = \overline{N}_{a} + \overline{N}_{b}$ $\overline{Q} = Q_{a} + Q_{b}$ $M = M_{a} + M_{b} + (\frac{h_{a}}{Z} + \frac{h_{b}}{Z})N_{a}$ (41)

However, (40), (41) do not make use of the no slip - no delamination conditions. These provide two constraints not only on displacements but on boundary condtions as well.

Appropriate boundary conditions can be derived using the principle of virtual displacements of the layer middle surfaces.

$$U_{i}^{*}$$

 B_{i}^{*} (i = a,b) (42)
 W_{i}^{*}

where the asterisk denotes a virtual quantity. Multiplying
equations (10) by the virtual displacements (42) in the order
listed, adding the products, integrating over shell length and
summing over the layers, we get:

$$\sum_{i=a}^{b} \int_{C} \left[\left[N \right]_{x_{i}}^{+} \left(\tau_{1i} - \tau_{2i} \right) \right] u_{i}^{+} + \left[M_{x_{i}}^{-} - Q_{i}^{-} + \frac{1}{2} hi \left(\tau_{1i}^{-} + \tau_{2i}^{-} \right) \right] \beta_{i}^{+} + \left[Q_{i}^{-} - \left(\frac{1}{R} \right) N \right]_{\theta_{i}}^{+} + \left[(P_{1i}^{-} - P_{2i}^{-}) \right] w_{i}^{+} + dC \right] = 0$$

$$(43)$$

since the virtual work done by a shell in equilibrium through a vietual displacement is equal to zero.

After integration by parts, the virtual work principle for the multilayered cylinder takes the form:

$$\sum_{i=a}^{b} \left[\left[N_{x_{i}}^{u} i^{*} + M_{x_{i}}^{\beta} i^{*} + Q_{i}^{w} i^{*} \right]_{0} \right]_{0}^{i=a} + \int_{0}^{L} \left[\left(\frac{1}{\tau} + \frac{\tau_{2i}}{\tau_{2i}} \right)^{u} i^{*} + \frac{1}{2} hi \left(\frac{\tau_{1i}}{\tau_{1i}} + \frac{\tau_{2i}}{\tau_{2i}} \right)^{\beta} i^{*} \right]_{0}^{i=a}$$

Table in the second sec

$$+ (p_{1i} - p_{2i}) w_{i}^{*} j dx \} = .$$

$$= \sum_{i=a}^{b} \int_{0}^{L} [N_{x_{i}} U_{i}^{*} + M_{x_{i}} \beta_{i}^{*} + Q_{i} (\beta_{i}^{*} + W_{i}^{*})$$

$$+ \frac{N_{6i}}{R} w_{i} dx$$

$$(44)$$

The first quantity in brackets on the left hand side of (44) involves terms which are specified at the boundaries, namely:

$$\sum_{i=a}^{D} [N_{x_{i}}^{u} i^{*} + M_{x_{i}}^{\beta} \beta_{i}^{*} + Q_{i}^{w} i^{*}]_{0}^{L}$$

Summing over layers gives

$$\begin{bmatrix} N_{x_{a}} a^{*} + M_{x_{a}} b^{*} a^{*} + Q_{a}^{\psi} a^{*} + N_{x_{b}}^{\psi} b^{*} + M_{x_{b}}^{\beta} b^{*} + Q_{b}^{*\psi} b^{T} c^{T} b^{T} b$$

State this derivation does not allow for slip or delamination, the virtual displacements must be constrained to:

$$u^{*} = u_{b}^{*} + (1/2)ha_{a}^{*} + (1/2)h_{b}_{b}^{*}$$

$$(45)$$

$$w^{*}_{a} = w_{b}^{*} + (\overline{w}_{b} - \overline{w}_{a})^{*}$$
Substituting into (49) and collecting terms, the quantities to be specified at x = 0 and x = L are found to be:

either
$$N_x + N_x$$
 or u_b specified

either $1/2 h_a N_{x_a} + M_{x_a}$ or β_a specified

46)

either $1/2 h_b N_x + M_x or B_b$ specified

either $Q_a + Q_b$ or w_b specified

 $Q_a (\overline{w}_b - \overline{w}_a)$ specified

Note that the first four conditions are not a unique set. Other possibilities are (u_a, u_b, β_a, w_b) or (u_a, u_b, β_b, w_b) specified, but the set (46) seems to be a good choice.

The last condition of (46) is the result of retaining thermal expansion through-the-thickness while dropping terms of order h/Rthroughout the remainder of the derivation. For cases where \overline{w} must be retained, the following procedure can be employed. For simplicity, free-free boundary conditions are considered, though the treatment is analogous for any set of conditions specified.

Since the last of (46) is a temperature dependent, $\overline{w}_{b} - \overline{w}_{a}$

is a priori specified. Hence, for free boundaries, either Qa = 0or $(\overline{w_b} - \overline{w_a}) = 0$. Qa = 0 is acceptable for special cases but is not generally true. $(\overline{w_b} - \overline{w_a})$ can be rigorously satisfied by redefining the reference surface location in layer a, i.e.,

$$\overline{w}_{a}(x, Z_{0}) = \int_{0}^{Z_{0}} \alpha_{c_{a}} T_{a}(x, z) dz$$

$$w_{b}(x, \frac{h_{b}}{2}) = \int_{0}^{h_{b}/2} \alpha_{c_{b}} T_{b}(x, z) dz$$

Under these conditions, the no-slip requirement becomes

(47)

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$$u_{o_a} = u_{o_b} + (-Z_o \beta_a + 1/2 h_b \beta_b)$$

and all other results remain the same if 1/2 ha is replaced by $-Z_0$.

Note that when this approach is used, the second strain definition of equation (8) must be used in the form:

$$\varepsilon_{\theta} = \frac{W_{i} + \overline{W}_{i}}{R_{i} + Z}$$
 (i = a,b)

in order to have a zero stress state for the case of an isotropic material with the same α_c in both layers and T = constant.

V. SAMPLE PROBLEM

The problem selected was the slow cooling of pyrolytic graphite. Because of the difference in thermal expansion coefficients in both "a" and "c" directions of the pyrolytic graphite and mandrel material and also because of curvature effects, normal and shear stresses at the deposit-mandrel interface will be formed during the cooling process. These may be of sufficient magnitude to cause flaking or delamination. An investigation of their behavior with changing material and geometric properties is therefore of interest.

The test case considered a laminated cylinder with free-free edges and a constant temperature $T_0 = -1000^{\circ}F$. The material properties used were averaged in the range 3000°F - 2000°F. Layer a, the top-most layer, was taken to be pyrolytic graphite, layer b commercial (ATJ) graphite. The properties used are given in Table (B.1). The calculations were performed with the aid of a CDC 6600 computer. The program tabulation is given in Appendix A. Results showing the behavior of τ_j and p_j due to variation in lamina thickness and/or E/G_c ratio are in Appendix B. From these, the following conclusions may be drawn:

1. Figures (B.1) and (B.2) indicate a decrease in normal and shear stresses at the mandrel - PG interface as the E/G_{c} ratio is increases, implying that a material weak in shear is desirable to minimize stresses and therefore the possibility of debonding.

2. Figures (B.3) and (B.4) show results when h = 0.50, $E/G_c = 20$ and $5 \ge h_a/h_b \ge 1$. Figures (B.5) and (B.6) show the case where $h_b = 0.25$, $E/G_c = 20$, $4 \ge h_a/h_b \ge 1$. All the curves indicate that a high h_a/h_b ratio is the desirable, for given material properties, for minimization of normal and shear stresses at the joint. This implies that a thin graphite mandrel is preferable to a thick mandrel. Note that when $h_a/h_b = 1$, the ultimate stress ($\sigma_{ult} = 18,000$ psi) in tension for pyrolytic graphite is exceeded.

3. To determine the behavior of the roots of equation (22) and establish a range wherein the various forms of solution (29)-(35) will occur, computations were also made for $1000 \ge h_a/h_b \ge 0.001$ with E/G_c at 50, 20 and 2.6. Results show that the Case 1 solution in the form (29) occurs whenever $h_a/h_b \ge 1$ independent of the E/G_c ratio. The constants $c_1 - c_3$ are affected by E/G_c , the constant c_1 being much more sensitive to a change in E/G_c than c_2 or c_3 .

4. The first two terms of (29) have their principal effects at the edge only. It was also observed that for $h_a/h_b >>1$, the value c_1 becomes so very large that the boundary value constants V_1 and V_2 tend to become very small, and as a first appromation the terms containing them can be dropped from the solution functions. In this case, (29) takes on a form similar to that for the solution for radial displacement of a single-layered cylinder, with suitably defined constants.

5. It should be kept in mind that all the above remarks are based on the numerical results and are valid in the range. 1000 $\gg h_a/h_b \gg 0.001$; 400 $\gg L/h \gg 26$; 0.05 $\gg h/R \gg 0.0033$

BIBLIOGRAPHY

Pyrolytic Graphite Engineering Handbook, General Electric
 Company, Metallurgical Products Dept., Detroit, Mich.

2. Papalegis, F. E. and Bourdeau, R. G., <u>Pyrolytic Reinforcements</u> <u>for Ablative Plastic Composites</u>, Air Force Materials Laboratory Technical Report ML-TR-65-35, May 1961.

3. Clark, T. J., <u>Development of Manufacturing Methods for</u> <u>Producing Pyrolytic Graphite in Various Shapes and Structures</u>, <u>General Electric Company Interim Progress Report IR-8-349-II</u>, October - December 1965.

4. Clark, T. J., <u>Development of Manufacturing Methods for</u> <u>Producing Pyrolytic Graphite in Various Shapes and Structures</u>, Air Force Materials Laboratory Technical Report AFML-TR-67-344 1967.

5. Hammond, M. L., <u>Metal Diffusion in Pyrolytic Graphite</u>, PhD Thesis, Stanford University 1965.

6. Knippenberg, W. F., Lersmacher, B., Lydtin, H., Moore, A. M., <u>Pyrolytic Graphite</u>, Philips Technical Review, Vol. 28, No. 8, 1967. 7. Research and Development on Advanced Graphite Materials, Volume XXXVII. <u>Studies of Graphite Deposited by Pyrolytic</u> <u>Processes</u>, Air Force Mate. Laboratory Technical Report WADD-TR-61-72, Vol. XXXVII. May 1966.

8. High Temperature Materials, Incorporated, <u>Pyrolytic Graphite</u> Data Sheet, revised February 1962.

Garber, A. M., Nolan, E. J., Scala, M. S., <u>Pyrolytic Graphite</u>
 <u>-- A Status Report</u>, General Electric Company, Space Sciences
 Laboratory Report No. R63SD84, October 1963.

10. Gebhardt, J. J. and Berry, J. M., <u>Mechanical Properties of</u> Pyrolytic Graphite, AIAA Journal Vol. 3, No. 2. February 1965.

11. Gebhardt, J. J. and Berry, J. M., <u>Interpretation of Room</u> <u>Temperature Mechanical Properties Test Data for Pyrolytic</u> <u>Graphite</u>, General Electric Company, Space Sciences Laboratory Report No. R64SD39, May 1964.

12. Diefendorf, R. J., <u>Preparation and Properties of Pyrolytic</u> <u>Graphite</u>, General Electric Research Laboratory, Report No. 60-RL-2572M, November 1960.

Garber, A. M., <u>Pyrolytic Materials for Thermal Protection</u>
 Systems, Aerospace Engineering, Vol. 22, No. 1, January 1963.

14. Levy, S., Thermal Stresses in Pyrolytic Graphite, presented atthe AIAA Launch and Space Vehicle Shell Structures Conference,April 1963.

McDonough, T. B., Thermal Stresses in Transversely Isotropic
 Shells of Revolution, PhD Thesis, University of Pennsylvania, 1965.

16. Kliger, H. S., Conical Shells of Pyrolytic Graphite Type Materials, MMAE Thesis, University of Delaware, 1967.

Kligher, H. S., Vinson, J. R., Truncated Conical Shells of Pyrolytic
 Graphite Type Materials, AIAA Paper, 68-295, 1968.

18. Raju, P. P., Shallow Shells of Pyrolytic Graphite TypeMaterials, PhD Dissertation, University of Delaware, 1968.

19. Daugherty, R. L., Noncircular Cylindrical Shells of Pyrolytic **Graphite Type Materials, MMAE Thesis, University of Delaware, 1969.**

20. Daugherty, R. L., and Vinson, J. R., Noncircular Cylindrical Shells of Pyrolytic Graphite Type Materials, Transactions 11th Midwestern Congress of Applied Mechanics, 1969.

21. Ambartsumian, S. A., Theory of Anisotropic Shells, NASA Technical **Translation** TT-F-118, 1961.

22. Dong, S. B., Membrane Stresses in Laminated Anisotropic Shells,Proc. ASCE, Vol. 90, EM 3, June 1964.

23. Dong, S. B., <u>Analysis of Laminated Shells of Revolution</u>, Proc. ASCE, Vol. 93, EM 6, December 1966.

24. Dong, S. B., Pister, K. S., Taylor, R. C., <u>On the Theory</u> of Laminated Anisotropic Shells and Plates, Journal of the Aerospace Sciences, Vol. 29, No. 8, August 1962.

25. Radkowski, P. P., Davis, R. M., Bolduc, M. R., <u>A Numerical</u> <u>Analysis of the Equations of Thin Shells of Revolution</u>, ARS Journal, January 1962.

26. Reissner, E., <u>On the Theory of Thin Elastic Shells</u>, Reissner Anniversary Volume, J. W. Edwards, Ann Arbor, Michigan, 1949.

27. Radkowski, P. P., <u>Thermal Stress Analysis of Orthotropic</u> <u>Thin Multi-Layered Shells of Revolution</u>, presented at AIAA Structures Meeting, Palm Springs, Calif., April 1963.

28. Sepetoski, W. K., Pearson, C. E., Dingwell, F. W., Adkins, A. W., <u>A Digital Computer Program For the General Axially-</u> <u>Symmetric Thin Shell Program</u>, Trans. ASME, Journal of Applied Mechanics, Vol. 29, No. 4, December 1962.

29. Jones, J. P., and Whittier, J. S., <u>Axially-Symmetric</u>
<u>Motion of a Two-Layered Timoshenki-Type Cylindrical Shell</u>,
Trans. ASME, Journal of Applied Mechanics, Vol. 33, Series E,
No. 4, December 1966.

30. Tsai, S. W., and Azzi, V. D., <u>Strength of Laminated Composite</u> Materials, AIAA Journal, Vol. 4, No. 2, February 1966.

31. Paul, B., <u>Linear Bending Theory of Laminated Shells Under Axi-</u> <u>Symmetric Load</u>, Trans. ASME, Journal of Applied Mechanics, Vol. 30, Series E, No. 1, March 1963.

32. Au, N., <u>Stresses and Strains in Multi-Layer Disks</u>, <u>Cylinders</u> <u>and Spheres Under Pressure Loading and an Arbitrary Radial</u> <u>Temperature Gradiant</u>, Aerospace Corp. Report SSD-TDR-63-227, October 1963.

33. Keeffe, R. E., and Windholz, W. M., <u>Dynamic Analysis of a Multi-</u> Layered Cylinder, Kaman Nuclear Report No. AMC-67-20, May 1967.

34. Zudans, Z., <u>New Formulation and Evaluation of Elastic Shell</u> Theory, PhD Thesis, University of Pennsylvania, 1966.

35. Zudans, Z., <u>Structural Response of Re-Entry Vehicles</u>, Franklin Institute Research Laboratories, Report F-B-2097, March 1966.

36. Vinson, J. R., <u>Thermal Stresses in Laminated Circular Plates</u>, in Proceedings of the 4th Natl. Congress of Applied Mechanics, 1958.

37. Summers, G. D., <u>Theoretical Analysis of Rectangular Isotropic and</u> Orthotropic Laminated Plates, PhD Thesis, University of Delaware, 1966. 38. Mehta, V., <u>Laminated and Single-Layered Orthotropic and Iso-</u> <u>tropic Plates of Pyrolytic Graphite Type Materials</u>, MMAE The University of Delaware, 1968.

39. Wu, C. I., <u>On the Lateral Vibrations of Rectangular Plates</u> <u>of Pyrolytic Graphite Type Materials</u>, MMAE Thesis, University of Delaware, 1968.

40. Wu, C. I., and Vinson, J. R., <u>On the Free Vibration of Plates</u> and Beams of Pyrolytic Graphite Type Materials, AIAA Paper 69-55, 1969.

41. Wu, C. I. and Vinson, J. R., <u>Influences of Large Amplitudes</u>, <u>Iransverse Shear Deformation and Rotatory Inertia on Lateral Vibrations</u> <u>of Transversely Isotropic Plates</u>, Journal Applied Mechanics, ASME, July 1969.

42. Burington, R. S., <u>Handbook of Mathematical Tables</u>, Handbook Publishers, Inc., Ohio 1956.

APPENDIX A Computer Program

Statistics and

| FORTRAN LY PROGRAM PGECINPUT. JUTPUT. TAPES-INPUT. TAPE9-OUTPU | IT) | 1 |
|---|----------------|-------|
| DIRENSION (CO(6), 114(6), 186(6) | PGE | 2 |
| DINENSION ORG(10), HP(10), HG(10), COEF(5), GJACO(5), ROUT | S12.61 PGE | 3 |
| COMMON /SHEAK/ DA.OB.FO | PGE | 4 |
| COMMON /KLP/ IC1.IC2.IC3.IC4.IC5.IC6.IH1.IM2.IM3.IH4.IM5.I | M6. IR1. IPGE | 5 |
| 182-183-184-185-186 | PGE | 6 |
| CORNON DITEMP | PGE | 7 |
| CONMON TEMP . EA, EAC . NUA . NUAC . EB . ERC . NUR . NUBC . HA. HB. R. G3A . G3 | B.CA.CB.PGE | 8 |
| 104.08.H.CA28.CAPC8. UNU.GAMA.GAMB.K(40).A(55).G(7).8T(30). | F'ITOA. F. PGE | 9 |
| 2108.80E(630), LOAD1, AH(50), LOAD2, EN(6, 7), FNXA, FNX8, FNXA, FNX | B. FNX. FMPGE | 10 |
| 3X . F NDA . F NOB . AC (3) . KL 1P . ELL . DEL PH (20) . V (6) . AL (18) . HH. DHW. DD | WW.WB.DWPGE | 11 |
| 48 . DOWS . DODWS . WA . DWA . HU . DWU . DOWU . TAU. DTAU. WPJ . HWA . DWW | A. HUA. UNPGE | 12 |
| SUA | PGE | 13 |
| EQUIVALENCE (IC1.ICO(1)). (IM1.IIM(1)). (IR1.IRE(1)) | PGE | 14E |
| REAL NUA. NUAC . NUB. NJBC . NUNU. K. LUADI . LUADZ | PGE | 15 |
| READ (5.12) (ORQ(1), [=1.4) | PGE | LAR |
| READ (5.12) (HP(1).1=1.6) | PGE | 178 |
| READ (5.12) (HQ(K).H=1.4) | PGE | 18R |
| READ (5.11) TEMP.DLTEMP | PGE | 198 |
| READ (5.11) EASEACSNUASNUAC | PGF | 202 |
| READ (S.11) ER.ERC.NUR.NURS | PGF | 218 |
| READ (5.9) AT(1). AT(2). AT(3). AT(4) | PGE | 222 |
| READ (5.10) (DELPH(J).J=1.11) | PGE | 2 3 R |
| WRITE (9.13) (HO(M).M=1.4) | PGF | 244 |
| WRITE (9.14) TEMP | PGF | 254 |
| WRITE (9.15) EA. FAC. NUA. NUAC | PGF | 264 |
| WEITE (9.16) EB.EBC.NUB.NUBC | PGF | 274 |
| COFF(1)+50- | PGE | 28 |
| COFF(2)+2G | PGF | 29 |
| COEF(3)+2.6 | PGF | 36 |
| DQ 6 114-1.6 | PGF | 31 |
| 00 8 8+1.5 | PGF | 32 |
| DO 8 L=1.3 | PGF | 33 |
| HA-HP(114) | PGE | 36 |
| MB-H2(H) | PGF | 35 |
| R=30. | PGE | 36 |
| SACO(L)=EA/CCFF(L) | PGE | 37 |
| G3A=G3A(0(L) | PGF | 38 |
| G3B + EB/(2, 9(1, +NUBC)) | PGE | 19 |
| CALL PREL13 (1.M.114) | PGE | 60 |
| CALL POLYR (6.G.ROOTS.D) | PGE | 41 |
| CALL RICF (KOUTS.AC.KLIP) | PGF | 42 |
| CALL THERM | PGE | 43 |
| CALL MISC | PGE | 44 |
| DO 7 [J/=1.4 | PGE | 45 |
| ELL=CRO(IJP) | PGE | 46 |
| 8F (ELL.EQ.Q.) GO TO 7 | PGE | 47 |
| AM(1)=AC(2)++2-AC(3)++2 | PGE | 48 |
| AN(2)+2.+(AC(2)+AC(3)) | PGE | 44 |
| AM(3)=AC(2)+AH(1)-AC(3)+AH(2) | PGE | 50 |
| AM(4)=AC(3)+AH(1)+AC(2)+AP(2) | PGE | 51 |
| AN(17)=AH(1)+AG(3)-AH(2)+A(2) | PGE | 52 |
| AM(18)=A*(1)+AC(2)+AM(2)+AC(3) | PGE | 53 |
| AM(25)=AH(1)=AC(2)+AH(2)=AC(3) | PGE | 54 |
| AN(26)=AH(1)+AC(3)-AH(2)+AC(2) | PGE | 55 |
| AN(5)=AC(2)=AH(3)=AC(3)=AH(4) | PGE | 56 |
| AM(6)=AC(3)=AH(3)+AC(2)=AH(4) | PGF | 57 |
| IF (KL1P-5) 1,2,3 | PGE | 58 |
| 1 CONTINUE | PGE | 59 |
| 8F (KL14-2) 4,5.6 | PGE | 60 |

```
PGE
 2 CALL EKLIPS
                                                                                    61
   60 TO 6
                                                                               PGE
                                                                                     62
 3 CALL EKLIPS
                                                                               PGE
                                                                                     63
   60 TO 6
                                                                               PGE
                                                                                     64
 4 CALL EKLIPI
                                                                               PGE
                                                                                     65
                                                                               PGE
   60 TO 6
                                                                                     66
                                                                               PGE
 5 CALL EKLIPZ
                                                                                     67
                                                                               PGE
 6 CONTINUE
                                                                                     68
                                                                               PGE
   CALL MISC
                                                                                     69
                                                                               PGē
                                                                                     70
 7 CONTINUE
                                                                               PGE
 . CONTINUE
                                                                                     71
                                                                               PGE
                                                                                     72
                                                                               PGE
                                                                                     73
                                                                               PGE
                                                                                     74
 9 FORMAT (4E15.7)
                                                                               PGE
                                                                                     75
10 FORMAT (6E12.5)
                                                                               PGE
                                                                                     76
11 FORMAT (4E15.0)
                                                                               PGE
                                                                                     77
12 FORMAT (16F4.0)
13 FORMAT (44 HB=12F9.3)
                                                                               PGE
                                                                                     78
                                                                               PGE
                                                                                     79
14 FORMAT (1X, SHTEMP=E12.5)
                                                                               PGE
                                                                                     80
15 FORMAT (1X, 6HAPROP=4E15.7)
                                                                               PGE
                                                                                     81
16 FORMAT (1X.6H8PROP=4E15.7/)
                                                                               PGE
                                                                                     82
   END
                                                                               PGE
                                                                                     83-
   SUBROUTINE UCOFF (FHTWW.CONST.X)
                                                                               **** 1
   COMMON DETEMP
COMMON TEMP, EA, EAC, NUA, NUAC, EB, EBC, NUB, NUBC, HA, HR, R, G3A, G3B, CA, CB,
                                                                                      2
                                                                                      3
  10A, DB, H, CACB, CAPCB, NUNU, GAMA, GAMB, K (40), A (55), G(7), BT (30), FYTOA, FN
                                                                                      4
  2TOB, BDE ( AOO) , LUADL , AM( SO) , LJAD2 , EN( 6, 7) , FNXA, FNXB, FMXA, FMXB, FNX, FM
                                                                                      5
  3X.FNOA,FNGB,AC(3),KLIP,ELL,DELPH(20),V(6),AL(18),WW,DWW,DDWW,WB,DW
                                                                                      .
  48, DDWB, DDDWB, WA, DWA, HU, DAU, UDWU, DUDHU, TAU, DTAU, MPJ, NWA, DWWA, HUA, UW
                                                                                      7
  5UA
                                                                                      8
   REAL NUA, HUAC , NUB , NUPC . NUNU . K. LOADI . LOADZ
   PP4=-(ELL/2.)*AC(1)
                                                                                     10
   PP5=-(ELL/2.) +AC(2)
                                                                                     11
   PP6=-1ELL/2.1+AC(3)
                                                                                     12
   CONST=BUE(19) * WA + HDE(20) * WB + BDE(21) * F * TWW-BT(20) * X/CAPCB
                                                                                     13
   RETURN
                                                                                     14
   END
                                                                                     15-
   SUBROUTIVE PRELIM (L.M.114)
                                                                               .....
   COMMON DLTEMP
                                                                               PRELT 2
   COMMUN TEMP, EA, EAC, NUA, NUAC, EB, EBC, NUB, NUBC, HA, HB, R, GJA, GJB, CA, CB, PELL
                                                                                     3
  10A.DB.H. CACH. CAPCB. 1UNU. GAMA. GAPR. K(40). A1551, G(7). BT( 30). FNTGA. FNPELL 4
  2TOB. ADE (600) . LOAN 1 . AMISO 1 . LOAD2 . EN16, 71 . FNXA, FNXB, FMXA, FMXB, FMX, FMPRELI 5
  3X,FYJA,FYJB,AC(3),KLIP,ELL,DELPH(20J,V(6),AL(18),WH,DWH,DDWH,WB,UMPRELI 6
  48, DUWB, DDDWB, WA, DWA, HU, DWU, DDHU, DDDWU, TAU, DTAU, APJ, HWA, DWWA, HUA, DWPRELI
                                                                                     7
                                                                               PRELI 8
  SUA
   REAL NUA, NUAC . NUP . NUBC . NUNU . K. LOADI . LOADZ
                                                                               PRELI 9
   CA-EA+HA/(1.-NUA++2)
                                                                               PRELIIO
   CB-EB+H8/(1.-NUR++2)
                                                                               PRELILL
   DA-EA+(4/++3)/(12.+(1.-+UA++2))
                                                                               PRELI12
   DB=EB+(HB++3)/(12.+(1.-NUB++2))
                                                                               PREL113
   H=HA+H8
                                                                               PRELIL4
   CACB=CA+C9
                                                                               PRELIIS
   CAPCB=CA+CB
                                                                               PRELILO
   NUNU=NUA- HUD
                                                                               PRELILT.
   GAMA=(5./6.)+(G3A+HA)
                                                                               PRELIIS
   GAM8=(5./6.)+(G38+H8)
                                                                               PREL 119
   K(15)=1.+CB/CA
                                                                               PRELIZO
   K(16)=L.+CA/CB
                                                                               PRELIZI
  K(17)=HA/HB
                                                                               PREL 122
```

the second s

| A(11)=(1,/12,)=(HA==2)+H=HA/(4,=K(16)) | PRELIZS |
|---|--------------------|
| A(12)=-HA+NUNU/((2.+R)+K(16)) | PRELIZS |
| A{13}=(H8+H8)+(K(15)/K(16})/12+H+H8/(4++K(16)) | PRELI25 |
| A(14)=H8+A(12)/HA | PRELI26 |
| A(15)=-(H/HA)+A(12) | PREL127 |
| FDUH={CA+NUA+CB+NUB}++2 | PRELT28 |
| CDUH+CAP:A++2 | PRELIZY |
| BOUN+ (CA+CAPCB)+(R++2) | PRELIJO |
| ALLALE (FOUN-COUNT/ROUN | PRELIBI |
| A1211=(H8##2)/12.+(5./24.1#(H8##2)/K(15) | PREL 132 |
| | PREL 133 |
| A(22)==()_0/0=/+(())/(n/+(16)) | BOLITA4 |
| A(2))=(),/24,)+(NA+90)/K(1)) | PACL134 |
| A124)=-1(5,/6,)=H0/HA)=A(12)-A(22) | PRELIDO |
| A[3]]=((1./12.)*(HA**2))*(1.+5./(2.*K(10))) | PRELISO |
| A[32)=-[5./6.)+[[G34/EA]+[LNUA++2]] | PRELIST |
| A(33)=(K(15)/K(16))=A(23) | PRELI38 |
| A{34}={5./12.}+{HA/{R+K(16)}}-GAMA/CA | PREL139 |
| A(41) = 0(11) A(51)=B(21) | PREL140 |
| A(42) + B(12) A(52) + B(22) | PRELI41 |
| A(43) = B(13) A(53) = B(23) | PRELI42 |
| A(44) = 8(14) A(54) = 8(24) | PREL143 |
| A(45) = B(15) A(55) = B(25) | PRFL 144 |
| | DOSI 145 |
| | 8051144 |
| A[9]}*A[]J]*A[]J]*A[]])*A[]]}*A[]]]*A[]]] | PRELING |
| A(42)*A(14)*A(23)*A(11)*A(22)*A(21)*A(12) | PRELIMI |
| A(43)=-A(L2)=A(22) | PRELISS |
| A(44) = A(15) + A(23) - A(11) + A(24) | PRELIAG |
| A(45)=A(16)+A(23)-A(12)+A(24) | PRELISO |
| A{51}=A(23)++2-A(31)+A(21) | PRELI51 |
| A(52)=-A(31)+A(22)-A(32)+A(21) | PRELI52 |
| A(53)=-A(32)+A(22) | PREL153 |
| A(54)=A(23)+A(34)-A(31)+A(24) | PRELI54 |
| A(55)=-A(32)+A(24) | PREL155 |
| 6(1) = 0(1) | PRELISO |
| 6(3) = 0(7) | PRELIS7 |
| C(5) = D(2) | PRELISA |
| C(3) = O(3) | PREI 159 |
| | BBSI IA.) |
| | PRELIOU BRELIAI |
| | PRELIGE BBELLAD |
| 6(7)************************************ | PRELIDZ |
| G[7]*A[53]*A[45]+A[43]*A[55] | PRELIDS |
| 6121=0.0 | PRELIDA |
| 6(4)+G(2) | PRELIOS |
| 6(6)=G(4) | PRELIGO |
| WRITE (9,3) L,G3A,G3B | PRELI67W |
| WRITE (9.4) HA.HB.R.TEMP | PRELIGHW |
| WRITE (9,5) (10P,G((0P),10P=1,7) | PRELIGYW |
| WRITE (9.1) CA.CB.DA.OB | PRELITOW |
| WRITE (9.6) CACH.CAPCE.JAMA.GAMB | PRELL71W |
| WRITE (9.8) HA.HB.FLL.L.K(17) | PREL 1724 |
| WRITE (9.7) | PREL 1 7 3 |
| K(1)=1.0 | . PRFL174 |
| K123aC(3)/C(1) | 00 F1 1 75 |
| wizi-cis <i>ji</i> /0157 | PREEL 7 7 |
| N131-0131/0161 W141-0131/0161 | PRELI/O |
| | PRELI// |
| PRUMP=13. TK131-K121TE21/3. | PRELI/8 |
| HRRP=[2,+(K(2)++3)-9,+(K(2)+K(3))+27,+K(4))/27, | PRELI79 |
| FRUMP + SHALL A | PRELIBJ |
| HRFP = SHALL B | PRELIBL |
| RATIO=HA/HB | PRELIB2 |

1000 - 100 -

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PREL 183
  DISC=(HRMP++2)/4.+(FRUMP++3)/27.
                                                                             PREL 184W
  WRITE (9,2) HA.HB.RATIO,DISC
                             IMPLIES KLIP = 2,3,4, OR 5 DEPENDING ON APRELISS
     DISCRIMINANT.LT. O
                            IMPLIES DEGENERATE CASE
KLIP = 1 MODIFIED
                                                                             PRELIBO
     DESCREMENANT. EQ. 0
                                           MODIFIED CLASSICAL SULUTION PREL187
     DISCRIMINANT. GT. J
  RETURN
                                                                             PRELISS
                                                                             PRELIS9
                                                                             PREL190
1 FORMAT (1X, 3HCA=E12, 5, 1X, 3HCB=E12, 5, 1X, 3HDA=E12, 5, 1X, 3HDB=E12, 5/) PRELIVE
2 FORMAT 1//1x, 3HHA=F10. 3, 1x, 3HHB=F10. 3, 5x, 6HHA/HB=F15. 7, 5x, 13HUISCRPREL192
 11HIMANT=E15.7//)
                                                                             PREL193
3 FORMAT 12X.4HG3A112.2H)=E15.7.4HG38 E15.7/1
                                                                             PREL194
4 FORMAT 12X, 4H HA=F10.2, 2X, 4H HB=F10.2, 2X, 2HR=F10.2, 2X, 6H TEMP=F10.PREL195
                                                                             PREL 196
 12/1
5 FORMAT (4(2X,2HG(12,2H)+E12.5)/3(2X,2HG(12,2H)+E12.5))
                                                                             PREL197
• FORMAT (2X, 5HCACR=E12, 5, 1X, 6HCAPCB=E12, 5, 1X, 5HGAMA=E12, 5, 1X, 5HGAMBPKEL173
                                                                             PREL 199
 1=E12.5/)
  FORMAT (20H ALL) ARE
                                                                             PRELI
8 FORMAT (F12.5,F12.5,F12.5,I3,1X,7H HA/H8=F12.5)
                                                                             PRELI
  END
                                                                             PRELI
  SUBROUTINE MISC
                                                                             .....
  COMMON OLTEMP
  COMMON TEMP . EA. EAC . NUA . NUAC . EB . EBC . NUB. NUBC. HA. HB. R. G3A. G38. CA. CB.
 1DA, DB, H. CACB, CAPCB, NUNU, GAMA, GAMB, K (40), 4(55), G(7), HT(30), FNT0A, FN
                                                                                    4
 2T08, RDE(600), LVADI, AM(50), LCAD2, EN(6,7), FNXA, FNXB, FMXA, FMXB, FNX, FM
                                                                                    5
 3X,FYOA,FNOH,AC(3),KLIP,ELL,DELPH(20),V(6),AL(18),WW,UWW,DUWH,AB,DA
                                                                                    6
 48,00WB,00DWB,HA,JWA,WU,DHU,OUWU,OOUHU,TAU,NTAU,WPJ,HHA,JWWA,WUA,OW
                                                                                    7
 SUA.
                                                                                    8
 REAL NUA, NUAC, NUB, NUBC, NUNU, K, LOADI, LOADZ
BDE(19)=CA+HA/(2, *CAPCB)
BDE(20)=(HB/HA)*BDE(19)
                                                                                   9
                                                                                  10
                                                                                  11
  BDE(21)=(1./R)+(CA+NUA+CB+NUB)/CAPCB
                                                                                  12
  BDE(22)+CB
                                                                                  13
  8DE(23) + ADE(22) + NUB/R
                                                                                  14
15
  BDE(24)=(HB++2)+ADE(22)/12.
  BDE(25) =HR/2.
                                                                                  16
  BDE(26) +RDE(22)/(R++2)
                                                                                  17
                                                                                  18
      K(1)=80E(19)
                                                                                  19
      K(2)=8DE(20)
                                                                                  20
      K(3)=80E(21)
                                                                                  21
      K(4)=BDE(22)
                                                                                  22
      K(5)=K(8)=80E(23)
                                                                                  23
      K(6)=80E(24)
                                                                                  24
      K(7)=BDE(25)
                                                                                  25
      K(9)=80E(26)
                                                                                  26
                                                                                  21
                                                                                  28
 AM(24)=AC(2)++2+AC(3)++2
                                                                                  29
 BDE(37)=GAMA+GAMB
                                                                                  30
 BDE(3A)=BOE(37)-(H/12.)+BDE(23)
                                                                                  31
 LOAD2=BT(11)
                                                                                  32
 LOAD1=0.0
                                                                                  33
                                                                                  34
35
 BDF(61)=8DE(19)+8DF(22)
                                                                                  36
                                                                                  37
 BDE(62)=HDE(20)+BUE(22)
 ODE(63)=90E(21)+8UE(22)-8DE(23)
                                                                                  38
 BOE(64) = BUE (24)+BDE(25) + (BDE(22)+BDE(20))
                                                                                  39
 BDE(65)=RDE125)+(BDE(22)+8DE(19))
                                                                                  40
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BDE1661=#0E1251+80E(63). 41 BDE(67)=BDE(23)+BDE(19) 42 BDE(68)=BOE(23)+RDE(20) 43 44 45 46 47 48 49 50 51 BDE(69)=RDE(26)-8DE(23)+RDE(21) AM(32)=(CA+NUA+CB+NUB)/R AM(33)=CA+HA/2. AR(34)=CA+H8/2. AN(35)=DA+(H+HA)+CA/4. AN(36)=08+(H+H8)+CA/4. AN(37)=AM(33)+AM(34) ARE38)=ANE37)+NUA/R AR(39)=GAMA+GAMB 52 AN(42)=DA+(CA/4.)*(HA**2) 53 AM(43)=(HA+H8)+(CA/4.) 54 BDE(81)=AH(33)+NUA/R 55 BDE(82)=AH(34)+NUA/R 56 AM(44) = AP(42) - AP(33) +80E(19) 57 AR(45)=AF443)-AN(33) +ADE(20) 58 AR(46)=808(81)-4M(33)+RUE(21) 59 AR(47)=08+(CA/4.)+(H8++2) 60 AM(48)=AM(41)-AM(34)+BDE(19) 61 AR(49)=AP(47)-AH(34)+RDE(20) 62 AR(50)=8GE(32)-A*(34)*ROE(21) 63 BDE(83)= ##/12.) + (RDE(22) + 80E(19)) 64 BDE(84)=EH/12.)+(ADE(22)+BDE(20)) 65 BDE(85)=AH(34)+(H/12.)+(BDE(22)+BDE(21)-BDE(23)) 66 BDE(71)=AH(33)-CA+8DE(14) 67 BOE(72) = AN(34) - CA+BDE(20) 68 BUE(75)=CA+(NUA/R-ROE(21)) 69 BDE(74)=CA+(YUA+BT(4)/R+BT(20)/CAPCB)-BT(5)/(L.-NUA) 70 BDE(75) =- CA+BDE(19) 71 BDE(76) =- C8+80E(23) 72 BDE(77) = C3+ (NUB/R-EDE(21)) 73 BDE(91)=AH(44)+AH(48) 74 BDE(92) = AM(45) + AM(49) 75 BDE(93)=48(46)+48(50) 76 77 RETURN 78 ENO 79-SUBROUTINE THERM ***** 1 CONHON DLTEMP THERN 2 COMMON TEMP.EA.EAC. NUA, NUAC.EB.EBC. NUR. NUBC. HA.HR.R. G3A. G3B.CA.CB. THERM 3 104.05.H. CACB. CAPCB. NUNU. GAMA. GAMO. R (40). A (55). G(7). AT (30). FNTOA. FNTHERM 4 2TOB, BDE (MOD) . LOADI, AM (50) . LJADZ, EN (6, 7) . FNXA, FNXA, FMXA, FMXB, FNX, FMTHERM 5 3X,FNOA,F398.AC(3).KLIP.ELL.UELPH(20).V(6).AL(18).WW.DWW.DDWM.WB.DWTHERM 6 48.00HB.000HB.WA.DHA.HU.DHU.OUHU.ODHU.DODHU.TAU.DTAU.HPJ.HHA.UHHA.HUA.GATHERM SUA THERN 8 REAL NUA . NUA . NUB . NUBC . NUNU . K. LOADI . LOADZ THERM 9 BT(1) = ALPHA(A) THERMLO BT(2) = ALPHA(AC) THERMIL ST(3) = ALPHA(B) THERM12 BTI41 - ALPHAIBCI THERML 3 BT(5) = WTRA = NTOA BT(6) = NTRA = NTOB THERM14 THERM15 BT(7) = w(BAR-A) AT Z = -HA/2. THERM16 THERML7 87(9) = E(BAR) = W(RAR-8) - W(BAR-A) THERMLB BT(10) = ALPHA(1,7) THERM14 BT(111 = ALPHA12,71 THERM20 8T(12) = MTXA THERM21

THERM22 ST(13) - NTX8 THERM23 ST(14) - EXPANSION IN THICKNESS DIRECTION - A BT(15) - EXPANSION IN THICKNESS DIRECTION - 8 THERM24 ST(16) = MCDIFIED AXIAL THERMAL RESULTANT A THERMZS STILTI - AXIAL THERMAL RESULTANT (HODIFIED) - B THERM26 BT(18) = BT(14) THERM27 8T(19) = 8T(15) THEAM28 ST(5)=(E4+HA)+(TEMP+BT(1)) THERM29 BT(6)=(ER+H8)+(TEMP+AT(2)) THERH30 ST(7)=-BT(2)+(TEMP+HA/2,)+DLTEMP+(BT(2)+HA/8.) THERMAL ST(8)-ST(4)+(TEMP+HB/2.)+OLTEMP+(BT(4)+H8/8.) . THERM32 ST(9)=BT(8)-BT(7) THERM33 BT(10)=RT(5)/(R+(1.-NUA))-CA+BT(9)/(R++2)-(DA/(2.+HA))+(DLTEMP/(R+THERM34 THERM35 1+211+87121 ST(11)=ST(6)/(R+(1.-NUS))-(DS/(2.+HS))+(DLTEMP/(R++2))+ST(4) THERM36 ST(12)={TEMP+BT(1)}+(EA+HA++3)/(12.+K)+(EA+HA++3)+(DLTEMP+BT(1))/(THERM37 THERM38 112. HAI AT(13)=(TEMP+BT(3))+(EB+HB++3)/(12.+R)+(EB+HB++3)+(DLTEMP+BT(3))/(THERM39 THERM40 112. +H81 BT(14)=(DA+NUA)+(TEMP+BT(2))/R THERM41 BT(15)=(D8+HUB)+(TEMP+6T(4))/R THERM42 BT(16)=BT(5)/(1.-NUA)-CA+(NUA+BT(9))/R-(DA+OLTEMP/(2.+HA))+(NUA+BTTHERM4) THERM44 1(2)/R1 BT(17)=8T(6)/(1.-NU8)-(08+0LTEMP/(2.+H8))+(NU8+8T(4)/8) THERM45 BT(18)=(04+NUA/R)+(8T(2)+TEMP) THERM46 ST(19)=(DB+NUB/R)+(AT(4)+TEMP) THERM47 BT(20)=8T(16)+8T(17) THERH48 ST(21)={UA+(0LTEM0+AT(2))/(2.+HA))+(NUA/R) THERM49 BT(22)=(DB+(DLTEMP+BT(4))/(2.+HB))+(NUB/R) THERM50 PP3=A(23)+A(53) THERM51 PP10=A[32]+A(43)-A(12)+A(53) THERM52 ADUN= (PP3/CA) + (BT(10) + BT(11)) THERM53 BDUM={CA+NUA+CB+NUB}/{CA+{R+CAPCB}} THERM54 COUM=PP3+(81(16)+81(17)) THERM55 DOUN=BOUN+COUH THERM56 HUCO+HUDA=HUD3 THERMS7 FOUM=CA+HH/(CB+CAPCB) THERMSS GDUM=(FDUM+(5./12.))+(PP10+9T(5)/(1.-NUA)) HDUM=(5./12.)+(HR+PP10/CAPCB)+BT(16) THERMSY THERM60 PDUM=EDUM-GDUM+HDUH THERMOL QDUM=(PP10/CC)+(+T(13)-8T(18)) THERM62 ROUM=POUM+ JUUH THERM63 80E(49) = 20UH/G(7) THERM64 WRITE 19,11 THERMOON WRITE (9.4) ADUN.BDUM.COUN.DDUM.EDUM.FDUM.GDUN.HDUM.PDUN.RUN.BDE(THE H66H 149) THERMOTH WRITE (9,2) THERM68W WRITE (9,3) (87(1),1=1,30) THERM69W RETURN THERMTO. THERM71 1 FORMAT (1X, 35HCOMPOHENTS OF BDE(49) ARE 2 FORMAT (1X, 1CH BT ARE) 3 FORMAT (1X, 6E12, 5) 4 FORMAT (1X, 4E15, 7) 11 THERM72 THERM73 THERM74 THERM75 END THE RM76-SURRGUTINE EXLIPT DIMENSION JIMILLI EKLIP 2 COMMON /SHEAK/ QA.OB.FQ EKLIP 3 COMMON ULTEMP EKLIP 4 COMMON TEMP.EA, EAC, YUA, NUAC, EB, EBC, NUB, NUBC, HA, HB, R, GBA, GBB, CA, CB, EKL IP

| 1DA, DR.H., CACB. CAPER, NUNU, GAMA, GAMA, K(40), A(55), G(7), BT(30), FYT0A, | FNEKLIP 6 |
|---|-----------|
| 2108 , 802 (600), LOAD (, AM 150), LOAD 2, EN (6, 7), FNXA, FNXB, FMXA, FMXB, FNX, | FREKLIP 7 |
| 3X,FN3A,F408,AC(3),KL1P,ELL,DELPH(20),V(6),AL(1d),WW,UWW,DDWW,WB, | DHEKLIP 8 |
| - 4R, DDNB, DJDWB, WA, DWA, WU, DWU, DDWU, DDDWU, TAU, OTAU, WPJ, WWA, UWWA, WUA, | DHEKLIP 4 |
| SUA | EKLIPIO |
| REAL NUA. NUAC . NUB. MIBC . NUNU. K. LUADI. LUADZ | EKLIP11 |
| REAL JTP | FET IP12 |
| | EFI 1011 |
| · · · · · · · · · · · · · · · · · · · | ENLIPIS |
| | EKLIP14 |
| | EKLIPIS |
| BUE(1) = A(44) = (A(1)) = 3) + A(4) = A(1) | EKLIP16 |
| BDE(2) = A(41) + (AC(1) + A(42) + A(42) + (AC(1) + E) + A(43) | EKLIP17 |
| AM(30)*RDE(1)/RDE(2) | EKLIPIS |
| BDE(3)=AM(5)=A(41)+AM(1)=A(42)+A(43) | EKLIP19 |
| BDE(4)=A=(6)=A(4))+AM(2)=A(42) | EKLIP20 |
| BDE(5)=4M(3)=A(44)+AC(2)+A(45) | EKL 1P21 |
| BDF(6)=AM(4)+A(4)+AC(3)+A(45) | FRI 1922 |
| BDE(7)=BDE(5) +BDE(3)+BDE(6)+BDE(5) | 6411073 |
| | ENLIPES |
| | ERLIPZA |
| | ERLIPZO |
| | EKLIP26 |
| BDE(II)=CDE(8)/KDE(4) | EKLIP27 |
| AM(7)=-A(24)+A((1)+AM(3))+(A(21)+(AC(1)++2)+A(22)) | EKLIP28 |
| AM(8)=A(23)+(AC(1)++2) | EKLIP24 |
| BDE(12)=AM(7)/AM(8) | EKLIP30 |
| AM(19)=A(21)+AM(1)+A(22) | EKLIP31 |
| AM(20)=A(2))+AM(2) | EKLIP32 |
| AM(21)=A(24)+AC(2) | FKI TP 33 |
| AM(22)=A(24)+AC(3) | FELIDIA |
| ADF(13)=AM(19)=ADF(10)-AM(20)=BDF(111)-AM(21) | Eritos. |
| BDE(14) = AM(19) + BDE(11) + AM(2)) + BDE(1) - AM(22) | ENLIP33 |
| | ENLIPSO |
| | ERLIPST |
| | EKLIP38 |
| | EKLIP39 |
| AR(1) = A (1) = 80E(15) + AP(2) = 80E(16) | EKLIP40 |
| AR(LIJ=AP(1)+BDE(16)-AN(2)+BDE(15) | EKL1F41 |
| BDE(17)=A4(1)/A4(4) | EKLIP42 |
| BDE(18)=AM(11)/AM(9) | EKLIP43 |
| AM(13)=~BDE(14)+BDE(12)+BDE(20)+AM(30)-BDE(21)/AC(1) | EKLIP44 |
| BDE(27)=BDE(19)+(AM(2)+BDE(18)-AM(1)+BDE(17))+BDE(20)+(AM(1)+BDE(| LEKLIP45 |
| 10)-AM(2)+BDE(11))-ADE(21)+AC(2) | EKLIPAD |
| BDE(28)=-BDE(19)+(AM(2)+BDE(17)+AM(1)+BDE(18))+BDE(20)+(AM(1)+BDE | EKLIPET |
| 111)+AM(2)+BUE(10))-PDE(2))+AC(3) | FKI IDLA |
| BDE(29) = AM(1) + BDE(27) + AM(2) + BDE(2H) | FE1 1040 |
| BDE(30) + AM(1) + BDE(28) - AM(2) + BDE(27) | SEL LOCA |
| AM(16) + OF(29) / AM(9) | ERLIPSU |
| | CALIPSI |
| | ERLIPSZ |
| | EKLIPSS |
| BUCT324+CAP(P)/JJIN(P0) | EKLIP54 |
| | EKLIPSS |
| BUE(39]=:XF(-F3]=S[N(F6] | EKLIP56 |
| BUE151/=AC(1)+(HA+BDE(12)-HB+AM(30)) | EKLIP57 |
| BDE(52)=-RUE(16)+HA+BDE(11)+HB | EKLIP53 |
| BDE(53)=808(1/)+HA-AÚE(10)+H8 | EKLIP59 |
| BDE1541+AC(31+BDE(52)+AC(2)+BDE(53) | EKLIPOO |
| BDE(55)=4C(2)+0DE(52)-AC(3)+BDE(53) | EKLIPAL |
| AM(12)=BT(2U)/CAPCB-BDE(21)+BT(9) | FELLOA2 |
| | FEITOLI |
| • | Eriles. |
| 80517011104024805123148112017485 | ENLIPO4 |
| TATION - CANDE TATIES / TATES / CAPED | EKLIPOS |

| | | ÐE | 1 | 78 | 3) | =(| . 8 | • | 8 1 | 1 | 2(| 01 | 1 | CI | AP | C | 8 - | . 0 | T | (6 | 1 | / | 11 | • | - h | U | 8) | | | | | | | | | | | | | | | | | | | | €ĸ | LI | P | 66 |
|---|------------|------|--------------|-----|------------|----------------|---------------|--------------|-----|-----|------------|----------------|-------------|------|------------|-----|------------|-----|------------|-----|-------------|-----|-------|-----|-----|------------|----------------|-------------|---|-----|-----|----|------------|------------------|-----|------------|----------|-----|-----|------------|------|-----|-----|-------|-----|-----|-------------|-----------|-----|-----|
| | D | 0 | 1 | 1 | | 1. | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ĒΚ | LI | P | 67 |
| | ¥ | i | 1 | = (|). | a | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EK | LI | P | 58 |
| | n | ò | 1 | | 1= | ī. | . 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EK | Ē | P | 69 |
| | | Ĭ, | i | | 11 | | ý. | ٥ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | FK | 11 | P | 70 |
| 1 | è | 04 | T | | 461 | F | | Ű | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | FK | ĩ | P | 71 |
| • | ē | | | ., | Ň | - | | | | | | | | | ۷ ۱ | ž | a r | | | 1 2 | • | - 1 | | | | | | M | . 1 | 0 | • | | | | | 6.1 | | | | | | | | | | | FX | | 0 | 72 |
| | 5 | | | • | | | | | L / | 1 | 1 | | | - | • / | | 31 | 15 | • | 1 4 | | | • • • | | | | | ē | | v | | | | | - | | | | | | | | | | | | 5.2 | | 0 | 7 2 |
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| | 5 | | | ۲. | | n. | 15 | | | | | | | | * 0 | 1 | | . ~ | | | | | . ~ | | • • | | | | | | | | | | | | | | ~ | | | • • | 0 | . , | | | EN. | | 0 | 17 |
| | | | | | | = 4 | 19 | | • • | | | • | 1C | . (| 21 | • | 5. | ינ | I. | . / | | • / | IC. | • | 2) | | 50 | 15 | | 0 | 1 | | A | | • | 21 | • | | 6 | () | | 0 | U | EI | r | 01 | CK. | | 2 | 10 |
| | | AL | . (| 21 | | EL. | JE. | | | | ! | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EK. | LI | - | |
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| | E | N (| 1 | • ! | >) | *- | E. | N | 11 | | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EK: | LI | PI | 14 |
| | Ł | | Z | • | | =/ | 12 | 0 | ., | | Q | 0 . |)E | 0 | 12 | 1 | • 4 | M | (| 6 | 1 | - / | M | C | 30 | 11 | ŦĂ | M | 4 | 9 | 1 | + | | ۹ (| 5 | " | | | | | | | | | | | EK | LI | PE | 30 |
| | E | N | Z | • 4 | | =t | N : | 1 | ٢. | 1 |) | | | | | | | | ~ | | | | | - | | | | | | | | | | | | | | | | . . | | | _ | | | | EK | LI | Pt | 31 |
| | E | N | 2 | • 3 | | = 1 | M | 14 | • 1 | • • | • | (- | - 4 | CI | (3 | 1 | * 9 | 0 | E | () | 8 |) ∢ | A | С | (2 |) | <pre>#IP</pre> | D | E (| 1 | 71 | 1 | + 1 | A M | (| 4 9 |) 1 | P (| 4 | 51 | 31 | • | 8 | DE | () | u | EKI | LI | Po | 52 |
| | 1) | - 4 | C | 12 | 1 | • • | υ | E (| 11 | Ŭ |) 1 |) • | A | M | 15 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | _ | | | | | | | | EK | LI | Pt | 33 |
| | ŧ | N (| 2 | , 4 |) | = / | | 14 | • * |) | • | () | 10 | C | 3) | ٠ | 80 |)E | C | 17 |) | • / | IC | (| 2) | + | D D | E | 1 | 8 |) | - | | • (| 4 | , , | • | A | C | د ا | .) (| 18 | D | Εl | 10 | 2) | ĔΚΙ | LI | PF | 14 |
| 1 | + | AC | t. | 2) | ٠ | 01 | 5 | (1 | 11 |) |) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | ĔΚI | Lſ | PE | 55 |
| | E | h (| 2 | , 5 |) | = 0 | 4 | 14 | 2, | 3 |) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EKI | LI | PE | 16 |
| | E | N C | 2 | , 6 |) | a - | . <u>.</u> | AI | 2 | | 41 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | EKI | LI | PE | 37 |
| | E | N (| 3 | , 1 | . 1 | a () | 0 | E (| l H | 15 | 1 | • 1 | IC | 1 | () | - | AP | • (| 3(|)) | • | ((| 30 | ε | 18 | 4 |) • | () | 10 | 1 | 1 1 | • | •; | 2) | + (| ; A | M | 3) | +6 | 30 | E (| 1 | 2 |) • | (8 | 30 | ΕKI | LI | Pe | 9.8 |
| 1 | E | 8 8 | 13 |) • | 1 | AC | | 11 | • | | 2 |) • | • 6 | 41 | 4 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ł | EKI | LI | Pd | 19 |
| | E | NC | 3 | • 2 |) | z - | E | N | 3 | | 1 | J | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EKI | LI | Pq | 10 |
| | E | N (| 3 | , 3 |)) | •0 | D | 5 (| 8 | 55 |) (| • / | ۱C | (2 | 2) | - | R C |)E | C | 10 | 1 | • (| G | A! | M8 | + | 30 | E | ĿЭ | 4 |) • | A | 2 | 11 |) (| • | BL | JE | (1 | 11 |) • | 1 | 8 | UE | (6 | 94 | ЕKI | LI | P٩ | 21 |
| 1 | 11 | • 4 | M | (2 |) | 14 | - 13 | 96 | 1 | 1 | 1 | • 1 | • (| 64 | 4.4 | | + A | M | 1 | 1) | | 80 |) E | 0 | H 3 | 1 | } - | 80 | יב | I. | 1 8 | 1) | • | (P | 03 | 5 (| 8 | 3) | • / | A /- | 14 | 2) | 1 | | | | EKI | LI | 27 | 12 |
| | E | N (| 3 | . 4 | 1 | = A | 5 | 1 1 | ,) | | 83 | DE | : t | 8. | 5) | -1 | R J | E | (| l I |) | • (| G | 41 | ۳B | +{ | 80 | E | 8 | 4 | 1 4 | 4 | ¥, (| L L | 1 | - (| 30 |)F | () | lΰ | 1. | 1 | B | ÛE | (8 | 34 | EKI | 11 | μq | 3 |
| 1 | 11 | • | M | (2 |) | 1. | 8 | Cr | : (| l | .) |) • | 1 | G | L M | A | + A | M | (| () | • (| B C |)ē | 11 | 83 |) |) + | 91 | פו | (| l I | 1) | • (| 8 | U | Et | 6 | 3) | • / | A / 1 | 12 | 11 |) | | | 1 | EKI | 11 | 23 |)4 |
| | E | | 3 | , 5 |) | x - | E. | N | 13 | ۱, | 31 |) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | - (| EKI | | Pq | 15 |
| | E | NC | 5 | . 6 | 1 | *+ | • | (3 | ١, | 4 |) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EKI | LT | Py | 16 |
| | E | N C | 4 | . 1 |) | ٩Ç | X | PI | P | 4 |) (| • E | N | () | ι. | L |) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | - (| EKI | | P9 | 1 |
| | E | | 4 | . 2 | 1 | = 5 | | P | - | P | 41 | • | F | NI | 11 | | 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | - | EKI | 1 | P 9 | 8 |
| | E | | 4 | . 3 |) | • 3 | N | (1 | | 3 |) (| 9 | 0 | 51 | 3 | 1 |) - | ÷ | N | 11 | , 4 | 5) | | 80 | DE | 1 | 32 |) | | | | | | | | | | | | | | | | | | | EKI | LI | P9 | 9 |
| | E | | 4 | . 4 | 1 | a ÷ | N | (1 | | 3 | > | e e | 0 | El | 3 | 2 | • (| Ē | N | l I | , 4 | • 1 | | 81 | ĴĒ | 0 | 31 | 1 | | | | | | | | | | | | | | | | | | (| EKI | 11 | P | |
| | E | | 4 | . 5 | 1 | ŧ, | N | () | | > |) e | 9 | 1) | EI | 3 | 3 |) - | Ę | N | 11 | , / | 5) | | e | DE | (] | 14 | 1 | | | | | | | | | | | | | | | | | | 1 | EKI | 1 | ρ | |
| | Ē | | 4 | , 6 |) | = 6 | N | (1 | | 5 |) (| e e | υ | Ē | 3 | 4 | | Ē | ¥(| 11 | • 6 | 5) | ٠ | 31 | DE | 1 | • • |) | | | | | | | | | | | | | | | | | | 1 | EKI | 1 | P | |
| | E | | 5 | . 1 |) | = E | | P(| P | 4 |) • | F | h | 12 | 2. | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ĺ | EKI | .1 | P | |
| | E | | 5 | . 2 |) | =E | X | PI | - | P | 4) | | ٤ : | 11 | 2 | • | 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EKI | 1 | P | |
| | Ē | | 5 | . 3 |) | •E | N | 12 | | 3 | | 91 | 0 | E (| 3 | i |) - | E | NI | 2 | . (| •) | | 80 | DE | (] | 12 |) | | | | | | | | | | | | | | | | | | 1 | EKI | Ĩ | P | |
| | Ē | 11 | 5 | . 4 | 1 | ۰Ē | N | (2 | | 3 |) • | . A | υ | E (| 3 | Ž | • | - | N | 2 | . 4 | •) | | 80 | DE | Ù | ĥ. | 1 | | | | | | | | | | | | | | | | | | Ì | EKI | Ĩ | P | |
| | ĒI | | 5 | . 5 |) | = é | N. | (2 | | 5 |) • | | D | Ē | 3 | 3 | - (| E | N | 2 | . 6 | 5 | | 90 | 2E | 0 | 4 |) | | | | | | | | | | | | | | | | | | Ĩ | KI | ī | P | |
| | EI | | 5 | . 6 | 1 | 1 | N | 12 | | 5 |) • | A | DI | EI | 3 | 4 | | Ē | N | 2 | . 6 | . 1 | | 80 |)E | () | 13 | 1 | | | | | | | | | | | | | | | | | | Ì | KI | i. | P | |
| | Ē | 11 | 6 | 1 | j. | • 2 | XF | 2 | è | 4 | | E | 1 | (1 | | 1 | | - | | | | | | - • | - | | - | · | | | | | | | | | | | | | | | | | | Ì | KI | 1 | P | |
| | FI | 4 8 | 6 | . 2 | 1 | F | x | Pi | | p | 63 | | F! | 11 | 3 | | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Ì | KI. | ī | 0 | |
| | Ē | 11 | 6 | . 1 | 1 | | NI | | | 4 |) • | | DI | EI | i | i | - | = | | 1 | . 4 | , 1 | | Ar |)F | () | 2 | , | | | | | | | | | | | | | | | | | | | KI | 1 | P | |
| | E | | 6 | 4 | 5 | Ē | | 1 | | 4 | 1. | P | 0 | Ē | 1 | 2 | | i. | Ň | 1 | . 4 | | | 81 | E | i | 1 | 1 | | | | | | | | | | | | | | | | | | | KI | 1 | P | |
| | FI | 41 | 6 | 5 | i. | ÷ | NI | 13 | | 5 | \ • | À | D! | 51 | 1 | 3 1 | - | Ē | 40 | i | | | | 31 | F | i | 4 | 5 | | | | | | | | | | | | | | | | | | Ē | ik i | 1 | P | |
| | FI | | 6 | . 6 | 1 | F | N | 1 | | 5 |) . | | 31 | FI | 1 | 4 | • | 2 | NI | í | . 6 | | | AC | F | 13 | | 5 | | | | | | | | | | | | | | | | | | Ì | | 1 | 0 | |
| | | | | | | | | | | - | | U | 0. | | 1 | | | | | , | | | | | | ., | | • | | | | | | | | | | | | | | | | | | | R. | | 0 | |
| | 61 | i e | ۱. | 7 | 1 | | 4 | | 1 | 1. | • R | T | 1 | 20 | | 10 | | 0 | r e | | a c |) E | 4 | A 1 | 1 | • A | T (| r a | 1 | | . 7 | | ۱. | . | - 1 | ы | . / | 2 | . 1 | • | 1 14 | T | | сı. | | 16 | i k i | | 0 | |
| 1 | | . M | | | 5. | . n | T | í | 2 | 1 | /1 | 1 | | | | | - | 1 | | 1 | 2 | | a l | н т | | - U 21 | 3 | | , in the second | | | ÷. | 4 0 4 8 | (a) | с I | 4 | 3 | * | • ' | Ŷ | . 0 | | • • | , , , | | | 141 | | D | |
| • | | | 2 | 1 | | | 4 | 1 2 | 4 | 14 | | ÷. | 1 | 27 | 11 | 70 | | 2 | | | с. • а п | | 1 | 9.7 | | ة » د ه | T I | - 44 f U | 1 | | 1 7 | 1 | - n u | 1971) 1 1 - 1 | | ų. | τ/ 4/ | 2 | | | | | | 4.4 | , , | 16 | in L izi | | 0 | |
| | | - N | њ. 114 | | 1. | . 14 | 7 4 | | | 1 | -0 | | | - 14 | | | | - | с 0 Ц 0 | | 9 L 2 | 1 | | 4 7 | 1 | ס- ככ | | | ų. | | | | | | = 1 | 4 | | 6 | • * | | 10 | | • 3 | | | 6 C | | , t.' | 0 | |
| | | 11 | 1 | 7 | , · · | n Lei | - 1 - 1 | | 1 | | 7 1 | • | • | | | r 1 | | | 10 | | C • | | ¥ I | 1 | | ~ ~ | | | • 7 | • 2 | 50 | | - 0 | U | 6.6 | • | *1 | | | | | | | | | 6 | | | P | |
| | C P 2 A | | 11 | - | * * * - | | | 4 4 4 4 | 2 | • | 7 J 7 L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | NL. | | ~ | |
| | 2 P 2 + | 1 L. | 21 | - | 7 * 1 - | | с т с. • | 4 6 1 1 4 | E. | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | C | NL. | | 0 | |
| | C # | 14 | " | - | , - | i Li i ci i | اد بن م رز | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | - | . KL | | r . | |
| | | 14 | - | - | , • | . C I | • | - | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | C | | 1 | ~ | |
| | | | " | 4 | | | | 4 | • | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | t | RL. | | ~ | |
| | 2 1 | 10 | D , | 1 | | | | 3 | | () | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | t | ĸL | | P | |

And a state of the state of the

| | WRITE (9.3) (ADE(1), (+), 100) | EKLIP | |
|---|--|--------|---|
| | | FRI IP | |
| | | | |
| | WRITE (9,4) (AH(J);J=1,50) | EALIP | |
| | WRITE (9,10) | EKLIP | w |
| | WR1TE [9,6] [[EN[1,J],J=1,7],J=1,6] | EKLIP | |
| | CALL FINGLE (EN,V) | EKLIP | |
| | MRITE (9.7) (1.V(1).1-1.6) | FEL IP | M |
| | | | - |
| | | ERLIP | |
| | | EKLIP | |
| | AM(12)=BT(20)/CAPCR-BDE(21)+BDE(49) | EKLIP | |
| | PP1+AC(1)+ELL/2. | ERLIP | |
| | PP2+AC(2)+F11/2. | FRLIP | |
| | PP3+AF(1)+F(1)/2 | | |
| | | | |
| | LALL LIELKE EVINCIPTIPTIPTI | ERLIP | |
| | WRITE (9,7) ([,V(]),L+1,6) | EKLIP | W |
| | | EKLIP | |
| | AL(1)=-AM(30)=V(1) | EKLIP | |
| | AL (2) - AM (30) • V(2) * | FELLP | |
| | AL (3) ROE(10) BY (3)-ROE(1)) BY (A). | 6 | |
| | | ERL IF | |
| | | ERLIP | |
| | AL(5) - BUE (10) - V(5) - HUE (11) - V(6) | EKLIP | |
| | AL (6) = BUE (11) = V(5) + PDE (10) = V(6) | EKLIP | |
| | AL(7)+BDE(12)+V(1) | EKL 1P | |
| | AL(8)=-805(12)+2(2) | FRITP | |
| | AL (9) - RD-(1 () + W(3) + RDE(1 A) + W(4) | | |
| | | | |
| | | ERLIP | |
| | ALIII RUEII / V VI) - RUEII8 - V (6) | EKLIP | |
| | AL(12)8DE(18)+V(5)-RDE(17)+V(6) | EKLIP | |
| | | EKLIP | |
| | | EKLIP | |
| | AL (13)-AM(13)+V(1) | | |
| | | | |
| | METER/////////////////////////////////// | ERLIP | |
| | | EKLIP | |
| | AL (16) AH (15) - Y (3) - AH (14) - Y (4) | EKLIP | |
| | AL(17)AM(14)+V(5)+AM(15)+V(6) | EKLIP | |
| | AL(18)=-AM(15)=AM(14)=V(6) | EKLIP | |
| | WRITE (9.A) | FRIIP | - |
| | WEITE (9.3) (AL(1), (-), 18) | | |
| | | ENLIP | |
| | | EKLIP | |
| | | EKLIP | |
| | A=DELPH(KF) | EKLIP | |
| | IF (X.GT.ELL) GO TO 2 | EKLIP | |
| | P1-AC(1)•x | EKI 1P | |
| | #2=AC(2)+X | | |
| | | | |
| | r #==== 1 / f = n | ENLIP | |
| | | EKLIP | |
| | | EKLIP | |
| | CALL DIFF (PI.PZ.P3) | EKLIP | |
| | | EKLIP | |
| | | FELTP | |
| | WWWW ()) • F (P) • • • (2) • F (P (- P)) • F (P (- P) • • • • • • • • • • • • • • • • • • | | |
| | | TENLIP | |
| | | ERLIP | |
| | nma. 4111-20517071-4151-20511111+4131-80511571+4141-805(131)+4(2)4 | BERLIP | |
| 1 | DE11411+V(6)+BDE(15) | EKLIP | |
| | ODWW-V(1)+AJE(102)+V(2)+AOE(112)+V(3)+BOE(122)+V(4)+BOE(132)+V(5) | +EKLIP | |
| 1 | BDE(142)+V(6)+BUE(152) | EKLIP | |
| 2 | WB-AL(1)+EXP(P1)+AL(2)+EXP(-P1)+FXP(P2)+(AL(3)+COS(P3)+A(4A)+A)+COS(P3)+A(4A)+A)+COS(P3)+A(4A)+A)+COS(P3)+A(4A)+A)+COS(P3)+A(4A)+A)+COS(P3)+A)+(A)+COS(P3)+(A)+COS(P3)+A)+(A)+COS(P3)+(A)+COS(P3)+(A)+COS(P3)+(A)+(A)+COS(P3)+(A)+(A)+(A)+(A)+(A)+(A)+(A)+(A)+(A)+(A | PEKLIP | |
| 1 | | Fri in | |
| • | ////////////////////////////////////// | ENLIP | |
| | *************************************** | | |

```
1(5)+BDE(141)+AL(6)+BDE(151)
                                                                             EKLIP
   DOWB-AL(1)+8DE(102)+AL(2)+8DE(112)+AL(3)+8DE(122)+AL(4)+8DE(132)+AEKL1P
  1L(5)*BDE(142)*AL(6)*BDE(152)
                                                                             EKLIP
   ODDW8=AL(1)+BDE(103)+AL(2)+BDE(113)+AL(3)+BDE(123)+AL(4)+BUE(133)+EKL(P
  1AL(5)+BDE(143)+AL(6)+BDE(153)
                                                                             EKLIP
   WA=AL(7)+EXP(P1)+AL(H)+EXP(-P1)+EXP(P2)+(AL(9)+COS(P3)+AL(10)+S[N(EKL[P
  1P311+EXP(-P2)+(AL(11)+COS(P3)+AL(12)+S1%(P3))
                                                                             EKLIP
   DWA=AL(7)+BDE(131)+AL(8)+BDE(111)+AL(9)+BDE(121)+AL(10)+BDE(131)+AEKLIP
  1L(11)+BDE(141)+AL(12)+BDE(151)
                                                                             EKLIP
   DDWA=AL(7)=BUE(102)+AL(8)=BCE(112)+AL(9)=BDE(122)+AL(10)=BUE(132)+EKL[P
  1AL(11)+BOE(142)+AL(12)+BDE(152)
                                                                             EKL 1P
   DDDWA=AL(7)+BUE(103)+AL(8)+BDE(113)+AL(9)+BDE(123)+AL(10)+BDE(133)EKL(P
  1+AL(11)+BDE(143)+AL(12)+8DE(153)
                                                                             EKLIP
                                                                             EKLIP
   FNTWH=(1./AC(1))+(V(1)+EXP(P1)-V(2)+EXP(-P1))+(EXP(P2)/AH(24))+(V(EKLIP
  1310(AC(2)+COS(P3)+AC(3)+SIN(P3))+V(4)+(AC(2)+SIN(P3)+AC(3)+COS(P3)EKLIP
2))+(EXP(-P2)/AM(24))+(V(5)+(-AC(2)+COS(P3)+AC(3)+SIN(P3))+V(6)+(ACEKLIP
  3(2)+SIN(P3)+AC(3)+COS(P3)))+BDE(49)+X
                                                                             FKLIP
   IF (KF.E9.1) CALL UCOFF (FNTHW,CONST.7)
MU=-BDE(19)*WA-BDE(20)*WR-BDE(21)*FNTHH+(BT(20)/CAPCE)*X+CUNST
                                                                             FEL IP
                                                                             FKI 1P
   DHU=-BDE(19)+DWA-PDE(20)+DWR-PDE(21)+H#+BT(20)/CAPCB
                                                                             EKLIP
   DDWU=-BDE(1+)+DDWA-BDE(20)+DDWB-BDE(21)+DWW
                                                                             EKLIP
   DDDWU=-BUE(19)+000W4-BDE(20)+000W8-30E(21)+00WW
                                                                             EXLIP
   TAU=LOAD1-B02(22) +00WU-BDE(23)+DWW
                                                                             EKLIP
   DTAU=-BDE(22)+UDDWU-BDE(23)+DDWW
                                                                             EKLIP
   MPJ=LOAU2-RUE(24)+UDD+R-BRE(25)+UTAU+BDE(23)+DWU+BDE(26)+WW
                                                                             EKLIP
   WUA=WU+HA+WA/2.+H8+W8/2.
                                                                             EKLIP
   DNUA - DHU+ HA+ DHA/2. +HB+ DHB/2.
                                                                             EKLIP
                                                                             EKLIP
   DDWUA=DDWU+HA+DDWA/2.+HB+DDWB/2.
   CALL RSLT (X)
                                                                             EKLIP
   CALL PRINT IXI
                                                                             EKLIP
 2 CONTINUE
                                                                             EKLIP
   RETURN
                                                                             EKLIP
                                                                             EKLIP
                                                                             EKLIP
                                                                             EKLIP
 3 FORMAT (1x, 9H BDE ARE /(10E12.5))
 4 FORMAT (10E12.5)
                                                                             EKLIP
 5 FORMAT (20H ANIJ) ARE
                                      1
                                                                             EKLIP
 6 FORMAT (1x, /Ell. 4)
7 FORMAT (4(1x, 2HV(11, 2H)=El2.5)/2(1x, 2HV(11, 2H)=El2.5))
                                                                             EXLIP
                                                                             EKLIP
 8 FORMAT (1X.2CH AL(1) ARE
9 FORMAT (6E12.5)
                                                                             EKLIP
                                                                             EKLIP
10 FORMAT (21H EN(1, J)BY ROWS ARE )
                                                                             EKLIP
   END
                                                                             EKL1P
                                                                             ....
   SUBROUTINE EKLIP2
   DIMENSION JIP(11)
                                                                             EKLIP
   COMMON /SHEAR/ QA.OR.FQ
                                                                             EKLIP
                                                                                   3
   COMMON DLTEMP
                                                                             EKLIP
   COMMON TEMP.EA.EAC.NUA.NUAC.EB.EAC.NUB.NUBC.HA.HB.R.G3A.G38.CA.CB.EKLIP
                                                                                   5
  IDA, DR, H, CACB, LAPCB, YUNU, GAMA, GAMB, K(40), A1551, G171, HT(30), FNTOA, FNEKLEP &
  2TOB. BDE(600). LOADI, AM(50), LUAD2, EN(6,7), FNXA, FNXE, FPXA, FMXB, FNX, FMEKLIP 7
  SX.FNCA.FNOB.AC(3).KLIP.ELL.LELPH(20).V(6).AL(18).WH.DHW.UDHW.WB.DWEKLIP &
  48. DONB. DODNB. WA. DHA. HU. UHU. DOHU. DODHU. TAU. DIAU. HPJ. HWA. UHHA. HUA. GHEKL IP 9
                                                                            EKLIP10
  SUA.
                                                                             EKLIP11
   REAL NUA-NUAC, NUB, NUBC, NUNU, K, LOADI, LOADZ
                                                                             EKLIP12
   REAL JIP
   P4=46(1)+FLL
                                                                             EKLIPIS
                                                                             EKLIP14
   PS=AC(2)+FLL
                                                                            EKLIPIS
   PO+ACI31+ELL
   BOE(1)+A(44)+(AC(1)++3)-A(45)+AC(1)
                                                                             EKLIP16
```

| RDE(2)=A(41)+(AC(1)++4)=A(42)+(AC(1)++2)+A(43) | EKLIP17 |
|--|-----------------|
| AM(30)=BDE(1)/8DE(2) | EKLIP18 |
| BDE(3)=AM(5)+A(41)+AM(1)+A(42)+A(43) | EKLIP19 |
| BDE(4)=AM(6)+A(41)+AM(2)+A(42) | EKLIP2U |
| BDE(5)=AH(3)=A(44)+AC(2)=A(45) | EKL1P21 |
| BDE(6)=AM(4)+A(44)+AC(3)+A(45) | EKLIP22 |
| BDE(7)=BDE(5)+BDE(3)+BDE(6)+BDE(4) | EKL1P23 |
| BOF(8)=B05(6)+BDE(3)-B0c(5)+BDc(4) | EKLIP24 |
| BDE(9)=BDE(3)++2++DE(4)++2 | EKL TP25 |
| BDE(10)=RDE(7)/RDE(9) | EKL1P26 |
| BDE(11)=BDE(81/BDE(9) | EKLIP27 |
| AN(7)=-A(24)+AC(1)+AM(30)+(A(2))+(AC(1)+2)-A(22)) | EKLIP28 |
| AN(8)=A(23)+(AC(1)++2) | EKLIP29 |
| BOF(12) = AM(7)/AM(8) | EKLIPSO |
| AM(19)=A(21)+AM(1)+A(22) | EKLIP31 |
| AN(20)=A(21)+AM(2) | EKLIP32 |
| AM(21)=A(24)+AC(2) | EKL1P33 |
| AM(22)=A(24)=A(13) | EKL1P34 |
| BDE(13)=AN(19)+BDE(10)-AN(20)+BCE(11)-AN(21) | EKLIP35 |
| BDF(14) = AM(14) + BDF(11) + AM(20) + BDF(10) - AM(22) | EKLIP36 |
| BDF(151=80F(13)/A(23) | EKL1P37 |
| BDE(16)=BDE(14)/A(23) | EKLIP38 |
| AH(9)=AH(1)++2+AH(2)++2 | EKLIP39 |
| AN(10)=AN(1)+ADE(15)+A4(2)+BDE(16) | EKLIP40 |
| AM(11)=AM(1)+BDE(16)-AM(2)+BDE(15) | EKLIP41 |
| BDE(17) = AM(1C)/AM(9) | EKLIP42 |
| BDE(18)=A%(11)/A?(9) | EKLIP43 |
| AN(13)=-BDE(19)+BDE(12)+BDE(20)+AM(30)-BDE(21)/AC(1) | EKLIP44 |
| BDE(27)+BDE(19)+(AM(2)+BUE(18)-AM(1)+BDE(17))+BUE(20)+(AM(| 1)+BDE(1EKLIP4> |
| 10)-AM(2)+80E(11))-90E(21)+AC(2) | EKL1P40 |
| BDE(28) =- BDE(14) + (AM(2) + 4DE(17) + AM(1) + BDE(18)) + BDE(20) + (AM | (1)+BDE(EKLIP47 |
| 111)+AM(2)+BUE(10))-BUE(21)+AC(3) | EKL1P48 |
| BDE(29) = AM(1) + 8DE(27) + AM(2) + 8DE(28) | EKLIP44 |
| BDE(36)=AM(1)+BUE(23)-AM(2)+BDE(27) | EKLIPSO |
| AM(14)=BDE(29)/AM(9) | EKLIPSI |
| AM(15)=80(30)/AM(9) | EKLIP52 |
| BDE(31) = EXP(P5) = COS(P6) | EKLIP73 |
| BDE(32) = t *P(P5) = SIN(P6) | EKLIP54 |
| BDE(33)*CXP(-P5)*COS(P6) | ERLIPSS |
| | EKLIP30 |
| DUE1711-AUI1/44447JE11/1-4444301/ | ERLIPSI |
| | ENLIP 30 |
| | ENLIP34 |
| DUCT 241-4013140001201400101400001233 | ENLIPOU |
| AM(1))=RT())/(AD(R=RDF()))ART(0) | EKI IDAD |
| | EKI 1963 |
| | FKI 1964 |
| AME 32 SAFE AANHAAC RENIERS / R | FELTPAS |
| AN(33)=CA+HA/2. | EKLIPAS |
| AM(34)=CA+HB/2. | EKL1P67 |
| AM(35)=0A+(H+HA)+CA/4. | EKLIPOR |
| AN(36)=JR+(H+HB)+CA/4. | EKLIPOY |
| AM(37)=AM(35)+AN(34) | EKLIPTO |
| AN(38)=AN(37)=NUA/R | EKLIPTI |
| AM (39) = GAMA+GAM8 | EKLIP72 |
| AH(42)=DA+(CA/4.)+(HA++2) | EKLIP73 |
| AM(43)=(HA+HB)+(CA/4.) | EKLIP74 |
| BDE(61)=AM(3))=NUA/R | EKLIP75 |
| ADFENDIAANE 14 JANUA / D | FK1 1976 |

| | AN(44)=AM(42)-AM(33)+BDE(19) | EKLIP77 |
|---|---|----------|
| | AN(45)=AM(43)-AM(33)+NDE(20) | EKLIP78 |
| | AM(46)=80E(81)-AM(33)=80E(21) | EKLIP79 |
| | AM(47)=DB+(CA/4.)+(HB++2) | EKLIPBO |
| | AN(48)=AM(43)-AM(34) #ADE(19) | EKLIPSI |
| | AN(49) = AN(47) - AN(34) + HOF (20) | EKLIP82 |
| | AM(50)+80E(42)-AM(36)+80E(21) | EKL1P83 |
| | BDE(H3) = (H/12, 1) = (BCF(22) = BDE(19)) | EKLIP44 |
| | BDF(86)=(1)/12,14(80F(22)+80=(20)) | EKLIPAS |
| | BDE(BS)=AH(39)+(H/12,1+(KDE(22)+BDE(21)-BDE(21)) | EKL 1986 |
| | | EKI IPAT |
| | 00.1.1-1.4 | FEI IPAR |
| | | EXI IDAU |
| | | Eri 1000 |
| | | ENLIPTU |
| | | ENLIPYL |
| | | ENLIPTZ |
| | EN(1,1)=3.(1)*(AR(99)*BUE(12)-AR(93)*AR(30))*AR(90) | ENLIPYS |
| | EN(1,2)=C.0 | ENLIPYA |
| | EN(1.3) = AH(44) = (AC(2) = BDE(17) = AC(3) = BDE(18) = AH(45) = (AC(3) = BDE(11) | IEKLIP95 |
| | 1-AC(2)+BDE(10))+AH(46) | EKLIPYO |
| | EN(1,4)=AM(44)=(AC(3)=HDE(17)+AC(2)=BDE(18))=AM(45)=(AC(3)=BDE(10) | JEKLIPYT |
| | 1+AC(2)+BDE(11)) | EKLIP98 |
| | EN(1,5)=EN(1,3) | EKL IP99 |
| | EN(1,6) = -EN(1,4) | EKLIP |
| | EN(2,1)=AC(1)+(BDE(12)+AM(48)-AH(30)+AH(49))+AH(50) | EKLIP |
| | EN(2,2)=0.0 | EKLIP |
| | EN(2,2)=EN(2,1) | EKLIP |
| | EN(2,3)=AM(46)+(-AC(3)+BDE(18)+AC(2)+BDE(17))+AM(49)+(AC(3)+BDE(1) | LEKLIP |
| 1 | 1)-AC(2)+PDE(1))+AM(50) | EKLIP |
| | EN(2,4)=AM(4d)+(AC(3)+BDE(17)+AC(2)+BDE(18))-AM(49)+(AC(3)+BDE(10) | JEKLIP |
| 1 | 1+AC(2)+BDE(11)) | EKLIP |
| | EN(2,5)=EN(2,3) | EKLIP |
| | EN(2,6)=-EN(2,4) | EKLIP |
| | EN(3,1)=0.0 | EKLIP |
| | EN(3,2)=8DE(45)+AC(1)+8DE(12)+(8DE(83)+AC(1)++2-GAMA)-AH(3U)+(8DE | IEKLIP |
| 1 | 104)+AC(1)++2-GAM8) | EKLIP |
| | EN(3,3)=00E(A5)*AC(2)-ADE(10)*(CAM8+BDE(64)*AM(1))+ADE(11)*(BDE(84) | VEKLIP |
| 1 | 1) • AM(2)) + RDE(17) • (GAMA + AM(1) • BDE(83)) - BDE(15) • (RDE(83) • AM(2)) | EKLIP |
| | EN(3,4)=AC(3)+BDE(85)-BDE(11)+(GAM8+BDE(84)+AM(1))-BUE(10)+(BDE(64 | FERLIP |
| 1 | 1) * AM(2)) * BDE(10) * (GAMA+AM(1) * BDE(H3)) * BUE(17) * (BDE(U3) * AM(2)) | EKLIP |
| | EN(3,5)=-EN(3,3) | EKLIP |
| | EN(3,6)=EN(3,4) | EKLIP |
| | EN(4,1)=FN(1,1)+COS(P6) | EKLIP |
| | EN(4,2)=EN(1,1)+SIN(P6) | EKLIP |
| | EN(4,3)=EN(1,3)+ODE(31)-EN(1,4)+BDE(32) | EKLIP |
| | EN(4,4)=EN(1,3)+8DE(32)+EN(1,4)+8DE(31) | EKLIP |
| | EN(4,5]=EN(1,5)+BDE(33)-EN(1,6)+BDE(34) | EKLIP |
| | EN(4,6)=EN(1,5)+BDE(34)+EN(1,6)+CDE(33) | EKLIP |
| | LN15,11=EN12,11+COS(P6) | EKLIP |
| | EN(5,2)=EN(2,1)+SIN(P6) | EKLIP |
| | EN(5,3)=EN(2,3)+ADE(3))-EN(2,4)+ADE(32) | EKLIP |
| | EN(5,4)=EN(2,3)+BUE(32)+EN(2,4)+BDE(31) | EKLIP |
| | EN(5.5)=EN(2.5)+0DE(33)-EN(2.6)+0DE(34) | EKLIP |
| | EN(5.6)-CN(2.5)+BDE(34)+EN(2.6)+BDE(33) | EKLIP |
| | EN(6.1)EN(3.1)+S(N(P6) | EKLIP |
| | EN(6,2)=EN(3,1)+COS(P6) | EKLIP |
| | EN(6,3)=EN(3,3)+BDE(31)-EN(3,4)+BDE(32) | EKLIP |
| | EN(6.4)=EN(3.3)+BUE(32)+EN(3.4)+BUE(31) | EKLIP |
| | EN(6. 5) = EN(3. 5) + BDE(33) - EN(3. 6) + BDE(34) | EKL 1P |
| | EN/A. A. A EN/A. S. ABADE/ JALASHI J. A JAADE/ 333 | 64119 |

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| | FKI 1P |
|---|---------------|
| EN(1.7)=AH(33)+BT(20)/CAPC8+BDF(8))+BT(9)+BT(18)-(HA/2.14) | ATISI/LIFKLEP |
| 1NUA))-81(12)/(1NUA)+(HA/2.)*81(21)+AM(46)*80F(49) | FELTP |
| EN(2.7) + AM(34) + BT(20)/CAPC8+ BDE(82) + BT(9) + BT(19) - (HB/2.1+) | BT(5)/(15KL10 |
| 1NUA))-ET(13)/(1NUE)+(HB/2.)+BT(22)+AH(50)+BDF(49) | FRITP |
| EN(1.7)=-EN(1.7) | FKLIP |
| EN(2.7)=-EN(2.7) | FRITP |
| EN(3.7)=LOAD1 | EKLIP |
| EN(4.7)=EN(1.7) | EKLIP |
| EN(5.7)=EN(2.7) | EKLIP |
| EN(6.7)=EN(3.7) | EKLIP |
| | EKLIP |
| WRITE (7,3) (BOE(1),1=1,100) | EKLIP W |
| WRITE (9.5) | EKLIP W |
| WRITE (9.4) (AM(J), J=1.50) | EKLIP W |
| WRITE (9.12) | EKLIP H |
| WRITE (9.6) ((EN([,J],J=1,7),[=1,6) | EKLIP W |
| CALL FINGLE (EN.V) | EKLIP |
| WRITE (9.7) (1.V(1),1=1.6) | EKLIP W |
| | EKLIP |
| | EKLIP |
| AH(12)=87(20)/CAPC8-8DE(21)+8DE(49) | EKLIP |
| PP1=AC(1)+ELL/2. | EKLIP |
| PP2=AC(2)+ELL/2. | EKLIP |
| PP3=AC(3)+ELL/2. | EKLIP |
| CALL CHECK2 (V,AC,PP1,PP2,PP3) | EKLIP |
| WRITE (9,7) (1,V(1), [=1,6) | EKLIP W |
| | EKLIP |
| AL[1]=AH[30]=V(1) | EKLIP |
| AL(2)=-AM(30)+V(2) | EKLIP |
| AL(3)=-8DE(10)+V(3)-8DE(11)+V(4) | EKLIP |
| AL(4)=8UE(11)+V(3)-RCE(10)+V(4) | EKLIP |
| AL(5)=BUE(1C)+V(5)-RCE(11)+V(6) | EKLIP |
| AL(6)=BUE(11)+V(5)+CUE(10)+V(6) | EKLIP |
| AL(7)=-006(12)+V(1) | EKLIP |
| AL(8)=80E(12)+V(2) | EKLIP |
| AL(7)=BDE(12)+V(1) | EKLIP |
| AL(H)=-RJE(12)+V(2) | EKLIP |
| AL(9)=DDE(1/) +V(3)+BUE(18)+V(4) | EKLIP |
| AL(10)=-RDE(19)+V(3)+8DE(17)+V(4) | EKLIP |
| AL(11)=-BDE(17)+V(5)+BGE(18)+V(6) | EKLIP |
| AL(12)=-BDE(18)+V(5)-BDE(17)+V(6) | EKLIP |
| | EKLIP |
| WRITE (9,8) | EKLIP W |
| WRITE (9,9) (AL(1),[=1,12) | EKLIP W |
| | EKLIP |
| 00 2 KF=1+11 | EKLIP |
| X=DELPH(KF) | EKLIP |
| IF (X.GT.ELL) GO TO 2 | EKLIP |
| P1=AC(1)+X | EKLIP |
| P2=AC(2)+X | EKLIP |
| P3=AC(3)+X | EKLIP |
| | EKLIP |
| | EKLIP |
| CALL DIFF (P1,P2,P3) | EXLIP |
| | EKLIP |
| | EKLIP |
| WW=V[]]+COS(P]]+V(2)+SIN(P]]+ExP{P2}+(V(3)+COS(P3)+V(4)+SI | V(P3))+EEKLIP |
| XP(-P2)+(V(5)+COS(P3)+V(6)+S[N(P3)]+80E(49) | EKLIP |
| DWW=V(1) + BDE(181) + V(2) + BDE(191) + V(3) + BDE(121) + V(4) + BDE(131) | +V(5)+05KL1P |

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10E(141)+V(6)+80E(151) FRITP DDWW-V(L)+BCG(182)+V(2)+ADE(192)+V(3)+BDE(122)+V(4)+BDE(132)+V(5)+EKLIP 18DE(142)+V(6)+8DE(152) EKLIP WB+AL(1)+COS(PL)+AL(2)+SIN(PL)+EXP(P2)+(AL(3)+COS(P3)+AL(4)+SIN(P3EKLIP 1)+EXP(-P2)=(AL(5)*COS(P3)*AL(6)*SIN(P3)) DWB=AL(1)*BUE(181)*AL(2)*BUE(191)*AL(3)*BUE(121)*AL(4)*BUE(131)*ALEKLIP 1(5)*BUE(141)*AL(6)*BUE(151) EKLIP 00w8+AL(1)+BDE(1821+AL(2)+BDE(1921+AL(3)+BDE(122)+AL(4)+BDE(132)+AEKL(4) 1L(5)+RDE(142)+AL(6)+BDE(152) DDDWB=AL(1)+BUE(143)+AL(2)+BDE(193)+AL(3)+BDE(123)+AL(4)+BDE(133)+EKL[P BAL (51+80E(1431+AL(6)+RDE(153) EKLIP WA=AL(7)+COS(P1)+AL(8)+S1N(P1)+EXP(P2)+(AL(9)+COS(P3)+AL(1U)+S1N(PEKL1P 13))+EXP(-P2)+(AL(11)+COS(P3)+AL(12)+SIN(P3)) EKLIP OWA=AL(7)+BDE(1A1)+AL(8)+BJE(141)+AL(9)+HDE(121)+AL(10)+BDE(131)+AEKLIP 1L(11)+BDE(141)+AL(12)+BDE(151) FRIIP DDWA-AL(7)+BUE(1H2)+AL(8)+BUE(192)+AL(9)+BDE(122)+AL(10)+BUE(132)+EKL[P 1AL(11)+DDE(142)+AL(12)+ADE(152) EKLIP DDDWA-AL(7)+80E(183)+AL(8)+80E(193)+AL(9)+80E(123)+AL(10)+80E(133)EKLIP 1+AL(11)+BDE(143)+AL(12)+BOE(153) EKLIP FELIP PNTWW=(1./AC(1))+(V(1)+SIN(P1)-V(2)+COS(P1))+(EXP(P2)/AM(24))+(V(3EKL1P 1)•(AC (2) •COS(P3) •AC (3) •S(N(P3)) •V(4) • (AC (2) •S(N(P3) -AC (3) •CJS(P3))EKL (P 21+1EXP(-P2)/AM(24))+(V(5)+(-AC(2)+CUS(P3)+AC(3)+SIN(P3))-V(6)+(AC(EKLIP 32) • SIN(P3) • AC(3) • COS(P3))) • NUE(49) • X IF (KF.EO.1) CALL UCGFF (FNTWW.CO'IST.O) WU=-BDE(19) • WA-BDE(20) • WB-BDE(21) • F'ITWW • (BT(20)/CAPCB) • X • CONST EKLEP EKLIP EKLIP DWU=-80E(17)*UWA-PDE(23)*OWH-BUE(21)*W4+BT(20)/CAPCB EKLIP DONU--BDE(131+DONA-ADE(20)+UDW8-BDE(21)+DMH EKLIP DODWU -- ADE(14)+000WA-00E(20)+0UC48-ADE(21)+00WW EKLIP TAU=LOAD1-BDE(22)+DOWU-BDE(23)+OWW EKLIP DTAU-BDE(22)+DDDHU-HDE(23)+DDHH WPJ=LOAU2-BDE(24)+DDDHR-RDE(25)+DTAU+BDE(23)+DHU+RDE(26)+HH EKL IP EKLIP WRITE [9,12] NG, D 48, DDWG, DDDWG, WA, DWA, DUWA, DUDWA WUA=WU+HA+W4/2, +H8+W8/2, DWUA=DWU+HA+UWA/2, +H8+W8/2, EKLIP EKLIP EKLIP DOWUA = DOWU+HA+OOWA/?.+H8+DOW8/2. EKLIP MRITE (9,11) WU,DWU,DDWU,WUA,DWUA,DDWUA Call RSLT (X) Call Print (X) EKLIP EKLIP EKLIP 2 CONTINUE EKLIP RETURN EKL IP EKLIP EKLIP

 B FORMAT (1x,9H BOE ARE /(LOE12.5))
 EKLIP

 4 FORMAT (10E12.5)
 EKLIP

 5 FORMAT (10E12.5)
 EKLIP

 6 FORMAT (20M AM(J) ARE
 EKLIP

 6 FORMAT (1X.7E11.4)
 EKLIP

 7 FORMAT (14.7E11.4)
 EKLIP

 8 FORMAT (1X.7E11.4)
 EKLIP

 9 FORMAT (1X.2H (11.2H)=E12.5)/2(1X.2HV(11.2H)=E12.5))
 EKLIP

 8 FORMAT (1X.2H AL(1) ARE
 EKLIP

 9 FORMAT (6E12.5)
 EKLIP

 10 FORMAT (1/1X.25H BETA(A)DERTVATIVES
 /E12.5.1X.E12.5.1 11 FORMAT (11,20H U(8) DERIVATIVES 10HU(A) DERIVATIVES /11,612.5. /1X, E12.5, 1X, E12.5, 1X, E12.5/1X, 2EKL IP /1x, E12. 5. 1x, E12. 5. 1x, 512. 5//) EKLIP 12 FORMAT (21H EN(1, JIBY ROAS ARE 1 EKLIP END EKLIP SUBROUTINE EKLIPA 1 DIMENSION JIPILLI COMMON DLTEMP EKLIP 2 EKLIP 1

CONNON TENP, EA, EAC, NUA, NUAC, EB, EBC, NUB, NUBC, HA, HB, R, G3A, G3B, CA, CB, EKLIP 4 104.08.H. CACH. CAPCB. NUNU, GAMA, GAMB, K(40), A(55), G(7), BT(30), FYTOA, FNEKLIP 5 2108, ADE (600) . LOADI . AM(5) . LOADZ . EN(6, 7) . FNXA . FNXH . FMXA . FMXA . FNX . FMEKLIP 6 3X, FYDA, FYOB, AC(3), KLIP, ELL, DELPH(20), V(6), AL(18), WH, DWW, WA, DWEKLIP 7 48,00HB,000HB,WA,DWA,HU,DWU,DUHU,DODHU,TAU,DTAU,HPJ,HWA,DWWA,HUA,DWEKLIP 8 EKLIP 9 SHA EKLIPIO REAL NUA, NUAC, NUB, NIBC, NUNU, K, LOADI, LOADZ EKLIP11 BDE(1)=A(44)+(AC(1)++3)+A(45)+AC(1) BDE(2)=A(41)+(AC(1)++4)+A(42)+(AC(1)++2)+A(43) EKLIP12 BOE(3)=BOE(1)/BDE(2) EKLIP13 EKLIP14 EKLIPIS BDE(4)=A(44)+(AC(2)+=3)-A(45)+AC(2) BDE(5)=A(41)=(AC(2)++4)-4(42)=(AC(2)+2)+A(43) FKI 1P16 EKLIP17 8DE(6)=8CE(4)/8DE(5) EKL IP18 BDF(7)+A(44)+(AC(3)++3)-A(45)+AC(3) FEL IP19 BDE(8)=A(41)+(AC(3)++4)-A(42)+(AC(3)++2)+A(43) EKLIP20 BOE(9)-BDE(71/BDE(8) EKLIP21 EKL1P22 FKLIP23 8DE(10)=8DE(3)+(A(21)+(AC(1)++2)+A(22))-A(24)+AC(1) EKLIP24 BDE(11)=4(23)+(AC(1)++2) EKL 1P25 BDE(12)=BDE(10)/BDE(11) EKLIP26 EKLIP27 BDE(13)=BDE(6)+(A(21)+(AC(2)++2)-A(22))-A(24)+AC(2) FEL 1P28 BDE(14) =A(23) =(AC(2) ==2) FKI 1P24 EKL IP SO BDE(15)=BDE(13)/20E(14) EKLIP31 EKLIP32 BDE(16)=0DE(9)+(A(21)+(AC(3)++2)-A(22))-A(24)+AC(3) BDE(17)=A(2))+(AC(3)++2) EKL 1933 EKLIP34 BDE(18) = 8DE(16)/8DE(17) P4=AC(1)+ELL EKL IP35 P5=AC(2)+ELL EKL IP36 #6=45(3)*ELL EKLIP3/ EKLIP38 EN(1,1)=(AM(44)+BDE(12)-AM(45)+BDE(3))+AC(1)+AM(46) EKLIP39 EKLIP40 EN(1.2)=EN(1.1) EN(1,3)=(AH(44)+BUE(15)-AH(45)+BUE(6))+AC(2)+AH(46) EKLIP41 EN11.41=0.0 EKLIP42 EN(1,5)=(AH(44)+BDE(18)-AH(45)+BDE(2))+AC(3)+AH(46) EKLIP43 EN(1,6)=0.0 EKL IP44 EN(4,1)=EN(1,1)+ExP(P4) EKLIP45 EN(4,2)=EN(1,2)=FxP(-P4) EKLIP46 EN(4,3)-EN(1,5)+COS(P5) EKLIP47 EN(4,4)=EN(1,3)+SIN(P5) EKLIP48 EN(4,5)=EN(1,5)+COS(P6) EKLIP44 EN(4,6)=EN(1,5)+SIN(P6) EKLIP50 EKLIP51 EN(2,1)=(AM(4#)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EKLIP52 EN(2,2)=EN(2,1) EKL1P53 EN(2,3)=(AM(48)+BDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EKLIP54 EN12,41=0.0 EKLIPSS EN(2,5)=(AM(+8)+8DE(18)-AM(49)+8DE(9))+AC(3)+AM(50) EKL 1P56 EN(2,6)=0.0 EKLIP57 EN(5,1)=EN(2,1)=EXP(P4) EKLIP58 EN(5,2)=EN(2,2)+EXP(-P4) EKLIP59 EN(5,3)+EN(2,3)+COS(P5) EKLIP60 EN(5,4)=EN(2,3)=SIN(P5) EKLIP61 EN(5,5)=EN(2,5)+COS(P6) EKLIP62 EN(5,6)-EN(2,5)+SIN(P6) EKLIP63

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| | | EKLIP64 |
|---|--|------------------------------|
| | EN(3,1)+PDE(85)+AC(1)-ADE(3)+(8UE(84)+(AC(1)++2 | 1+GAMB)+BDE(12)+(BUEKLIP65 |
| 1 | 1E(83)+(AC(1)++2)+GAMA) | EKL IP66 |
| | EN(3.2)=EN(3.1) | EKLIP67 |
| | EN(3.31+0.0 | EKLIPOB |
| | EN(3.4)=80F(85)+4C(2)-80F(6)+(80F(84)+(4C(2)++2 | +GAMB)+BDE(15)+(BUEKLIP69 |
| 1 | 15(A3)#(AC(2)##2)*GAWA1 | FKI 1P70 |
| | FM13.51=0.0 | FK1 1971 |
| | EN(1.4)-BOC/BELAA/121.BOC/1816/BOC/BELAC/212188 | 21-CAMA1-406/910/8(154) 1072 |
| | EIGELALACIZLANDI _CAMBI | EVI 1971 |
| - | EN/A 11-CN() 11-C/0/04 | ENLIFY3 |
| | | ENLIPTA |
| | | ENLIPIO |
| | EN(0,3)=-EN(3,4)=3[V(P3] | EKLIPIO |
| | EN(0,4)=EN(3,4)*(US(P)) | EKLIPTI |
| | EN16,5)=-EN(3,6)=S[N(P6) | EKLIP78 |
| | EN(6,6)=EN(3,6)+COS(P6) | EKLIP79 |
| | | EKLIPBO |
| | WRITE (9,2) (BDE(2),1=1,20) | EKLIP81W |
| | WRITE (9,3) | EKL 1P82W |
| | WRITE (9,4) ((EN([,J),J=1,7),I=1,6) | EKLIP33# |
| | CALL BINGO (EN.V) | EKLIP84 |
| | WRITE (9,5) (1,V(1),1=1,6) | EKLIP85W |
| | AM(12)=8T(20)/CAPC8-8DE(21)+8DE(49) | EKL IP86 |
| | PP1=AC(1)+ELL/2. | · EKLIP87 |
| | PP2=AC(2)+ELL/2. | EKLIPBB |
| | PP3=AC(3)+ELL/2. | EKLIPOY |
| | CALL CHECK4 (V.AC. PP1. PP2. PP3) | EKL [P90 |
| | WRITE (9.5) (1.V(1).1-1.6) | EKLIPYLA |
| | | EKL 1992 |
| | AL(1)=-BCE())*V(1) | EKL1P93 |
| | AL (2) = BUE (3) + V(2) | EKL 1094 |
| | AL (3)=BUE (6) + V(3) | EKI 1995 |
| | AL (4) == ROF (6) +V(4) | FRITPHA |
| | AL (\$1 #RUF (3) #V ()) | FKI 1P37 |
| | AL (A) =- 80F(9) eV(5) | Fri IDON |
| | | Ext IDoo |
| | AL / 71-805/12184/11 | ERLIP TT |
| | AL (B) BOS (1 2) BV (2) | 5VI 10 |
| | | |
| | AL (4) == 60((1) / 4 ()) | ENLIP Erito |
| | | EKLIP |
| | WFEET1=-OFEEB1+A101 | EKLIP |
| | ALTIZI-DUETIGI-ATSI | EKLIP |
| | WRITE (9,6) | EKLIP W |
| | WRITE (9,7) (AL(1),1=1,12) | EKLIP W |
| | do | EKLIP |
| | DO I KF+1,11 | EKLIP |
| | X=DELPH(KF) | EKLIP |
| | P1=AC(1)+X | EKLIP |
| | P2=AC(2)+X | EKLIP |
| | P3+AC(3)+X | EKLIP |
| | | EKLTP |
| | WW=V(1)*EXP(P1)*V(2)*EXP(-P1)*V(3)*COS(P2)*V(4)* | •SIN(P2)+V(5)+COS(PEKLIP |
| 1 | 131+V(6)+SIN(P31+RDE(49) | EKLIP |
| | DWW=V(1)+HOE(101)+V(2)+BDE(111)+V(3)+BDE(201)+V | (4)*BDE(211)+V(5)+BEKL[P |
| 1 | 1DE(221)+V(6)+HDE(231) | EKLIP |
| | DDWW=V(1)+NDE(102)+V(2)+NDE(112)+V(3)+BDE(202)+1 | V(4)+BUE(212)+V(5)+EKL[P |
| 1 | 18DE(222)+V(0)+8DE(232) | EKLIP |
| - | W8=AL(1)*EXP(P1)*AL(2)*EXP(-P1)*AL(3)*COS(P2)*A | (4)+SIN(P2)+AL(5)+EKLIP |
| 1 | 1COS(#3)+AL(6)+SIN(#3) | EKLIP |
| - | DW8+AL(1)+806(101)+AL(2)+806(111)+AL(3)+806(201) | +AL(4)+BDE(211)+ALEKLIP |

1(5)+BDE(221)+AL(6)+8DE(231) EKLIP DDW8=AL(1)+BDE(102)+AL(2)+BDE(112)+AL(3)+BDE(202)+AL(4)+BDE(212)+AEKL(P 1L151+EDE(222)+AL(6)+BDE(232) EKLIP DDDW8=AL(1)+BUE(103)+AL(2)+BDE(113)+AL(3)+BDE(203)+AL(4)+BUE(213)+EKL1P 1AL(5)+BDE(223)+AL(6)+BDE(233) EKLIP EKLIP WA=AL(7)+EXP(P1)+AL(8)+EXP(-P1)+AL(9)+COS(P2)+AL(10)+SIN(P2)+AL(11EKLIP 11+COS(P3)+AL(12)+SIN(P3) EKLIP DWA=AL(7)+BDE(101)+AL(8)+BDE(111)+AL(9)+BDE(201)+A(10)+BDE(211)+AEKLIP 1L(11) + BDE(221) + AL(12) + BDE(231) EKLIP DOWA=AL(7) + HOE(102) + AL(H) + BCE(112) + AL(9) + BDE(202) + AL(10) + AUE(212) + EKLIP EKLIP 1AL(11)+BDE(222)+AL(12)+BDE(232) DDDWA=AL(7)+PUE(103)+AL(8)+ADE(113)+AL(9)+BDE(203)+AL(10)+BDE(213)EKLIP EKLIP 1+AL(111)+BUE(223)+AL(12)+BDE(233) EKLIP FNTWW=(V(1)+EXP(P1)-V(2)+EXP(-P1))/AC(1)+(V(3)+COS(P2)-V(4)+SIN(P2EKLIP EKLIP 1))/AC(2)+(V(5)+S[N(P3)-V(6)+COS(P3))/AC(3)+BUE(49)+X IF (KF.EQ.1) CALL UCOFF (FNTWW, CONST.0) EKLIP WU=-RDE(19)+WA-BDE(20)+WB-BCE(21)+FVFHH+(RT(20)/CAPCE)+X+CUNST EKL IP DWU=-RDE(19)+UWA-BDE(20)+DWE-BDE(21)+WW+BT(20)/CAPCB EKLIP DDWU=-BCE(1+)+DDWA-HDE(2))+CJWB-RDE(21)+UWW FKI IP ODDHU=-BDE(19)+DUDHA-BDE(20)+DDDHB-BDE(21)+DDHH EKLIP TAU=LOAD1-BUE(22)+DOHU-BUE(23)+LAN EKL IP DTAU=-80E (22) +000WI-80E(23) +00WW FKLIP WPJ=LCAC2-RUE(24)+000W8-80E(25)+0TAU+RDE(23)+0WU+RDE(26)+WW EKLIP CALL RSLT (X) EKLIP CALL PRINT (X) EKLIP IF (X.EO.ABS(ELL/2.)) CALL VINSON (X.EA.EB.HA.HB.G34.G38.FNXB) EKLIP EKLIP 1 CONTINUE RETURN EKLIP EKLIP 2 FORMAT (1X, 9HBDE ARE /(10E12.5)) EKLIP FORMAT (1X, 20H EN(1, J) ARE EKLIP FORMAT (LX. /ELL. 4) EKLIP EKLIP 5 FORMAT (4(1x,2HV(11,2H)=E12.5)/2(1x,2HV(11,2H)=E12.5)) 6 FORMAT (1X,23H AL(I) ARE EKLIP 7 FORMAT (AE12.5) EKLIP END EKLIP SUBROUTINE ENLIPS DIMENSION JIP(11) FKLIP 2 COMMON DLTEMP EKL 1P 3 COMMON TEMP. EA. EAC. NUA. YUAC. EB. EBC. NUB. NURC. HA. HR.R. G3A. G3B. CA. CR. EKLIP IDA, DB, H, CASB, CAPCH, HUHU, GAMA, GAMA, KI401, AISSI, GI71, HII 301, FUTGA, FUEKLIP 3 2108. SDE (600) . LOADI . AMISUI . LUADZ . ENIG. 71, FNXA, FNXB, FMXA, FMXB, FNX, FMCKLIP 3X, FNDA, FNCB, AC(3), KLIP, ELL, DELPH(20), V(6), AL(14), HW, DHW, CUAM, HS, DHEKLIP 7 48.DONR.DUDHO. NA. CHA. HU. JHU. UDHU. DODHU. TAU. DTAU. HPJ. HHA. UHHA. HUA. UNEKLIP đ SUA EKLIP 9 READ NUA. MIAC. NUR. NURC. NUNU. K. LJADI. LOADZ EKLIPIU BDE(1)=A(44)+(AC(1)++3)+A(45)+AC(1) EKLIPII BDE(2)=A(41)+(AC(1)++4)+A(42)+(AC(1)++2)+A(43) EKLIP12 BDE(3)=HDE(1)/BDE(2) EKLIPLS EKLIP14 BDE(4)=A(44)+(AC(2)++3)+A(45)+AC(2) EKL IP15 BDE(5)=4(41)+(AC(2)++4)+A(42)+(AC(2)++2)+A(4)) EKLIP16 BDE(6)=BDE(4)/202(5) FKL 1P17 EKL IP14 BDE(7)=A(44)+(AC(3)++3)-A(45)+AC(3) EKLIP19 BDE(8)=A(41)+(AC(3)++4)-A(42)+(AC(3)++2)+A(43) EKLIP20 BDE(4)=BDE(7)/BDE(8) EKLIPZI EKLIP22

| | ENLIFED |
|--|--|
| BBE (1A) - BBE (3) BE (4/3) BE (4/4) BE (3) BE (3A) 331 - A/36 BAC(1) | EKLIP24 |
| | 641 1025 |
| BDE(11)*A(23)*(AC(1)**2) | ENLIPZS |
| BDE(12)=\$CE(10)/BDE(11) | EKLIP26 |
| | EKL (P27 |
| ARE (131-805 (A 14) A 131 18 (AF 1316831 AA 13311-A13438AF131 | FEL TP2H |
| BUEII JI-NUEIGI-IALZII-IALZII-ALZII-ALZII-ALZII-ALZI | 67.1020 |
| BDE(14)=A(23)=(AC(2)==2) | ENLIPZY |
| BDE(15)+BDE(13)/BDE()4) | EKLIP30 |
| | EKL (P31 |
| | EKI 1932 |
| | |
| BDE(17)+A(23)+(AC(3)+=2) | ENLIPSS |
| BDE(18)=NDE(16)/2DE(17) | EKLIP34 |
| P4=AC(1)+FLL | EKLIP35 |
| | FKI [P36 |
| | EV. 1017 |
| PD=AC(3)+ELL | ENLIPSI |
| | EKLIPSB |
| EN(1,1)=(AM(44)+BDE(12)-AM(45)+BDE(3))+AC(1)+AM(46) | EKLIP39 |
| EN(1.2)=EN(1.1) | EKL 1940 |
| | EXI TOAL |
| ENTLY SITURGED BUELTSI-ANTASI BUELBITACTED ANTAG | |
| EN(1,4)+5N(1,3) | EKLIP42 |
| EN(1,5)=(AM(44)+BDE(18)-AM(45)+BDE(9))+AC(3)+AM(46) | EKLIP43 |
| EN(1-6)=0.0 | EKLIP44 |
| | FK1 1945 |
| | EXI IDAA |
| EN(4,2)=EN(1,2)=EXP(-P4) | EKLIPHO |
| EN(4.3)=EN(1.3)+EXP(P5) | EKLIP47 |
| EN(4.4)=EN(1.4)=EXP(-P5) | EKLIP48 |
| RN/A BL-EN/L SIPEASIDAL | FKL 1P49 |
| | SEL 1850 |
| EN(4,6]=EN(1,3)=SIR(PD) | ENCIPSU |
| | EKLIPSI |
| | PVI I OE D |
| EN(2.1)+(AM(48)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) | CALIPSE |
| EN(2,1)+(AM(48)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) | EKLIP52 |
| EN(2,1)+(AM(48)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) | EKLIPSS EKLIPSS |
| EN(2,1)+(AM(4H)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4H)+PDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) | EKLIP52 EKLIP53 EKLIP54 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AH(4R)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) | EKL1952 EKL1953 EKL1955 |
| EN(2,1)+(AM(4H)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EN(2,2)=EN(2,1) EN(2,3)+(AM(4A)+PDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EN(2,4)=EN(2,3) EN(2,5)+(AM(4H)+PDE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 |
| EN(2,1)=(AH(4B)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AH(4A)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0.0 | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 |
| EN(2,1)=(AH(4B)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AH(4A)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AH(40)+PDE(18)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0.0 EN(2,6)=0.0 | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 FKIIP58 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AH(4R)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0.0 EN(2,6)=0.0 EN(2,1)=EN(2,1)+EXP(P4) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP58 EKLIP58 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AH(4A)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(5,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(-P4) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP58 EKLIP59 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4A)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4B)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)+D.0 EN(2,6)+D.0 EN(5,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP58 EKLIP59 EKLIP56 |
| EN(2,1)=(AN(4B)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)+DE(15)-AM(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)+DE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)=0.0 EN(2,6)=0.0 EN(5,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,4)+EXP(P5) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP58 EKLIP58 EKLIP59 EKLIP60 EKLIP61 |
| EN(2,1)=(AN(4B)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4A)+PDE(15)-AM(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,4)=EN(2,3) EN(2,5)=(AM(4d)+PDE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)=0,0 EN(5,6)=0,0 EN(5,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,4)+EXP(-P5) EN(5,4)=EN(2,4)+EXP(-P5) EN(5,4)=EN(2,4)+EXP(-P5) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP58 EKLIP59 EKLIP66 EKLIP61 EKLIP62 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)+0,0 EN(2,6)+0,0 EN(5,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(3)+P4) EN(5,5)=EN(5,5)+E(5)+E(5)+E(5)+E(5)+E(5)+E(5)+E(5)+E(| EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP58 EKLIP59 EKLIP66 EKLIP61 EKLIP62 EKLIP61 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(5,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,4)+EXP(P5) EN(5,5)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+S(H(P6)) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP59 EKLIP59 EKLIP60 EKLIP62 EKLIP63 |
| EN(2,1)+(AN(4H)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4A)+PDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)+D.D EN(2,6)+D.D EN(2,6)+D.D EN(2,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+EXP(P5) EN(5,6)=EN(2,5)+SIN(P6) | EKLIP52 EKLIP53 EKLIP54 EKLIP56 EKLIP57 EKLIP58 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP64 |
| EN(2,1)=(AN(4B)+BDE(12)-AN(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)+DE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)+DE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,6)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+SIN(P6) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1). | EKLIP52 EKLIP53 EKLIP54 EKLIP56 EKLIP56 EKLIP57 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP64 2) + (BDEKLIP65 |
| EN(2,1)+(AH(4H)+BDE(12)-AM(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(40)+PDE(18)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(3,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+CUS(P6) EN(3,1)=BDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BUE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BUE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BUE(1) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP64 21*(BDEKLIP65 EKLIP66 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(5,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+S(H(P6)) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)+BDE(A)+A(A) EN(3,1)=DDE(H5)+AC(1)+BDE(A)+A(A)+BDE(B4)+A(A)+BDE(A) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP66 EKLIP62 EKLIP63 EKLIP65 EKLIP65 EKLIP65 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)+D, O EN(2,6)+D, O EN(5,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,4)+EXP(-P5) EN(5,5)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+SIN(P6) EN(3,1)=BDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) 3(B3)+(AC(1)+2)+GAMA) EN(3,2)=CN(4,1) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP66 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP66 EKLIP66 EKLIP66 EKLIP66 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(18)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)+D,D EN(2,6)+D,D EN(2,6)+D,D EN(2,6)+D,D EN(5,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+S(H(P6)) EN(3,1)=DDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) IE(B3)+(AC(1)+2)+GAMA) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1)) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1)) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1)) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1)) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1)) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP64 2)+(BDEKLIP65 EKLIP65 EKLIP68 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4H)+PDE(1H)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)+D,D EN(2,6)+D,D EN(2,6)+D,D EN(2,6)+D,D EN(2,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+S(H(P6)) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) IE(B3)+(AC(1)+2)+GAMA) EN(3,3)=DE(H5)+AC(2)+HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) IE(B3)+(AC(2)+2)+GAMA) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP66 EKLIP64 5}*(BDEKLIP68 EKLIP69 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(4P)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(4P)+BDE(4))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(4P)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+ECJS(P6) EN(5,6)=EN(2,5)+CJS(P6) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) IE(83)+(AC(1)+2)+GAMA) EN(3,2)=EN(3,1)= EN(3,1)=DE(A5)+AC(2)+HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) EN(3,3)=PDE(A5)+AC(2)+HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) EN(3,4)=-EN(4,3) | EKLIP52 EKLIP53 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP65 EKLIP65 EKLIP65 EKLIP67 5]*(BJEKLIP68 EKLIP69 EKLIP67 |
| EN(2,1)+(AH(4H)+BDE(12)-AH(49)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(49)+BDE(4))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(49)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+S(H(P6)) EN(3,1)=DDE(H5)+AC(1)+BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) IE(B3)+(AC(1)+2)+GAMA) EN(3,3)=DE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) IE(B3)+(AC(2)+2)+GAMA) EN(3,6)=-EN(4,3) EN(3,6)=-EN(4,3) EN(3,5)=U,0 | EKLIP52 EKLIP53 EKLIP55 EKLIP55 EKLIP57 EKLIP58 EKLIP59 EKLIP60 EKLIP62 EKLIP63 EKLIP65 EKLIP55 EKL |
| EN(2,1)+(AH(4H)+BDE(12)-AH(4P)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)+(AH(4H)+PDE(15)-AH(4P)+BDE(4))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)+(AH(4d)+PDE(1B)-AH(4P)+BDE(4))+AC(3)+AH(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(5,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+SIN(P6) EN(3,1)=BDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) 3E(B3)+(AC(1)+2)+GAMA) EN(3,3)=DE(H5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) EN(3,3)=DE(H5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) EN(3,4)=-EN(4,3) EN(3,5)=J,0 EN(3,5)=J | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP67 5)*(BJEKLIP69 EKLIP70 EKLIP71 9)*(RD5411972 |
| EN(2,1)=(AM(4B)*BDE(12)-AM(49)*BDE(3))*AC(1)*AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)*PDE(15)-AM(49)*BDE(4))*AC(2)*AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4d)*PDE(1B)-AM(49)*BDE(4))*AC(3)*AM(50) EN(2,6)=0.0 EN(2,6)=0.0 EN(2,6)=0.0 EN(5,2)=EN(2,2)*EXP(P4) EN(5,2)=EN(2,2)*EXP(P4) EN(5,2)=EN(2,3)*EXP(P5) EN(5,4)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*EXP(P6) EN(3,1)=BDE(H5)*AC(1)*BDE(3)*(BDE(B4)*(AC(1)*2)*GAMB)*BUE(1) E(B3)*(AC(1)*2)*GAMA) EN(3,2)=EN(3,1) EN(3,3)=DE(B5)*AC(2)=HDE(6)*(BDE(B4)*(AC(2)*2)*GAMB)*BUE(1) E(B3)*(AC(2)*2)*GAMA) EN(3,6)=EN(3,5)*0.0 EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) EN(3,6)=RUE(B5)*AC(3)*ADE(1)+ADE(1) EN(3,6)=RUE(B5)*ADE(1)+ADE(1)+ADE(1) EN(3,6)=RUE(B5)*ADE(1)+ADE(| EKLIP52 EKLIP53 EKLIP54 EKLIP56 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP67 5)*(BDEKLIP65 EKLIP67 EKLIP71 9)*(NDEALIP72 EKLIP72 |
| EN(2,1)=(AM(4B)*BDE(12)-AM(49)*BDE(3))*AC(1)*AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)*PDE(15)-AM(49)*BDE(4))*AC(2)*AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)*PDE(1B)-AM(49)*BDE(4))*AC(3)*AM(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(5,2)=EN(2,2)*EXP(P4) EN(5,2)=EN(2,2)*EXP(P5) EN(5,3)=EN(2,3)*EXP(P5) EN(5,4)=EN(2,5)*EU(2,5)*EU(5) EN(5,6)=EN(2,5)*EU(2,5)*EU(2)*EO(5) EN(5,6)=EN(2,5)*EU(2)*EO(5)*EO(5)*EU(2)*EO(5)*EU(2)*EO(5)*EU(2)*EO(5)*EU(2)*EU(2)*EO(5)*EU(2)*EU(2)*EO(5)*EU(2)*EU(2)*EO(5)*EU(2)*EU(2)*EO(5)*EU(2) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP60 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP64 EKLIP67 5)*(BJEKLIP68 EKLIP67 EKLIP70 EKLIP71 9)*(NDEALIP72 EKLIP73 |
| EN(2,1)=(AM(4B)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)+PDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(6d)+PDE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(5,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+SIN(P6) EN(3,1)=DDE(M5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BUE(1) IE(B3)+(AC(1)+2)+SAMA) EN(3,2)=EN(5,1) EN(3,3)=DE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BUE(1) IE(B3)+(AC(2)+2)+GAMA) EN(3,3)=DE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BUE(1) IE(B3)+(AC(2)+2)+GAMA) EN(3,6)=EN(4,5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(4) EN(3,6)=EN(4,1)+E(4,5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(4) EN(4,1)=EN(3,1)+E(4)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(4) | EKLIP52 EKLIP53 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP65 EKLIP65 EKLIP65 EKLIP64 2)*(BDEKLIP65 EKLIP67 EKLIP67 EKLIP70 EKLIP73 EKLIP74 |
| EN(2,1)=(AM(4B)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)+PDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)+PDE(1B)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)=3,3 EN(2,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,3)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+CJS(P6) EN(5,6)=EN(2,5)+CJS(P6) EN(3,1)=DDE(1B)+AC(1)+BDE(3)+(BDE(84)+(AC(1)+2)+GAMB)+BDE(1) IE(B3)+(AC(1)+2)+GAMA) EN(3,2)=EN(4,5)+AC(2)+HDE(6)+(BDE(84)+(AC(2)+2)+GAMB)+BDE(1) IE(B3)+(AC(2)+2)+GAMA) EN(3,3)=PDE(A)+AC(2)+HDE(6)+(BDE(84)+(AC(2)+2)+GAMB)+BDE(1) IE(B3)+(AC(2)+2)+GAMA) EN(3,4)=-EN(4,3) EN(3,5)+U,O EN(3,6)+BDE(U5)+AC(3)+ADE(1B)+(BDE(83)+(AC(3)+2)-GAMA)-BDE(1) IE(64)+(AC(3)+2)-GAMB) EN(6,1)=EN(5,1)+C(P(P4)) EN(6,2)=CN(4,2)+C(1)+EXP(P4) | EKLIP52 EKLIP53 EKLIP55 EKLIP55 EKLIP56 EKLIP57 EKLIP58 EKLIP59 EKLIP60 EKLIP62 EKLIP63 EKLIP65 EKLIP65 EKLIP65 EKLIP65 EKLIP65 EKLIP67 S)*(BJEKLIP65 EKLIP67 EKLIP70 EKLIP71 9)*(PDEALIP72 EKLIP75 |
| EN(2,1)=(AM(4B)*BDE(12)-AM(49)*BDE(3))*AC(1)*AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)*PDE(15)-AM(49)*BDE(6))*AC(2)*AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)*PDE(1B)-AM(49)*BDE(4))*AC(3)*AM(50) EN(2,6)=3,0 EN(2,6)=3,0 EN(2,1)=EN(2,1)*EXP(P4) EN(5,2)=EN(2,2)*EXP(P4) EN(5,3)=EN(2,3)*EXP(P5) EN(5,3)=EN(2,3)*EXP(P5) EN(5,4)=EN(2,5)*CUS(P6) EN(5,6)=EN(2,5)*CUS(P6) EN(5,6)=EN(2,5)*SIN(P6) EN(3,1)=BDE(H5)*AC(1)=BDE(3)*(BDE(B4)*(AC(1)**2)*GAMB)*BUE(1) IE(B3)*(AC(1)**2)*GAMA) EN(3,2)=EN(3,1) EN(3,3)=*DE(H5)*AC(2)=HDE(6)*(BDE(B4)*(AC(2)**2)*GAMB)*BUE(1) IE(B3)*(AC(2)**2)*GAMA) EN(3,4)==EN(4,3) EN(3,6)=RUE(H5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)**2)=GAMB)*BUE(1) IE(B3)*(AC(3)**2)=GAMB) EN(3,6)=RUE(H5)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)**2)=GAMA)=BDE(4) EN(6,1)=EN(3,1)*EXP(P4) EN(6,1)=EN(3,1)*EXP(P4) EN(6,1)=EN(3,1)*EXP(P4) EN(6,1)=EN(3,1)*EXP(P4) EN(6,1)=EN(3,1)*EXP(P4) EN(6,1)=EN(4,1)*EXP(P4) EN(6,1)*EXP(P4) EN(6,1)*EXP(P4) EN(6,1)*EXP(P4) EN(6,1)*EXP(P4) EN(6,1)*EXP(P4) EN(| EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP65 EKLIP69 EKLIP70 EKLIP71 9)*(PDEALIP73 EKLIP75 EKLIP75 EKLIP75 EKLIP75 |
| EN(2,1)+(AH(4B)+BDE(12)-AH(4P)+BDE(3))+AC(1)+AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AH(4B)+PDE(15)-AH(4P)+BDE(6))+AC(2)+AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AH(4B)+PDE(1B)-AH(4P)+BDE(4))+AC(3)+AH(50) EN(2,6)=3,0 EN(2,6)=3,0 EN(3,1)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P5) EN(5,4)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+SIN(P6) EN(3,1)=DDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) E(B3)+(AC(1)+2)+GAMA) EN(3,3)=DDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) E(B3)+(AC(1)+2)+GAMA) EN(3,3)=DDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) E(B3)+(AC(2)+2)+GAMA) EN(3,3)=DDE(A5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) E(B3)+(AC(3)+2)-GAMB) EN(3,6)+ADE(B5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) E(B3)+(AC(3)+2)-GAMB) EN(6,1)=EN(3,1)+C(P(P4)) EN(6,3)=EN(3,3)+C(2)+C(P5) EN(6,3)=EN(3,3)+C(P5) EN(6,3)=EN(3,3)+C(P) EN(6,3)=EN | EKLIP52 EKLIP53 EKLIP54 EKLIP56 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP62 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP67 5)*(BDEKLIP68 EKLIP67 EKLIP70 EKLIP71 9)*(PDEALIP72 EKLIP74 EKLIP75 EKLIP76 |
| EN(2,1) + (AH(4B) + BDE(12) - AH(4P) + BDE(3)) + AC(1) + AH(50) EN(2,2) = EN(2,1) EN(2,3) = (AH(4B) + PDE(15) - AH(4P) + BDE(6)) + AC(2) + AH(50) EN(2,4) = EN(2,3) EN(2,5) = (AH(4B) + PDE(1B) - AH(4P) + BDE(7)) + AC(3) + AH(50) EN(2,5) = (AH(4B) + PDE(1B) - AH(4P) + BDE(7)) + AC(3) + AH(50) EN(2,5) = EN(2,1) + EXP(P4) EN(5,2) = EN(2,2) + EXP(P4) EN(5,2) = EN(2,2) + EXP(P5) EN(5,3) = EN(2,3) + EXP(P5) EN(5,4) = EN(2,5) + EXP(P5) EN(5,5) = EN(2,5) + EXP(P5) EN(5,5) = EN(2,5) + EXP(P5) EN(3,1) = DDE(H5) + AC(1) - BOE(3) + (BDE(B4) + (AC(1) + 2) + GAMB) + BDE(1) E(B3) + (AC(1) + 2) + GAMA) EN(3,1) = DDE(H5) + AC(2) - HDE(6) + (BDE(B4) + (AC(2) + 2) + GAMB) + BDE(1) E(B3) + (AC(2) + 2) + GAMA) EN(3,3) = (DE(H5) + AC(3) + ADE(1B) + (BDE(B3) + (AC(3) + 2) - GAMB) + BDE(1) E(B3) + (AC(3) + 2) - GAMB) EN(3,5) + U, O EN(3,6) = NDE(H5) + AC(3) + ADE(1B) + (BDE(B3) + (AC(3) + 2) - GAMA) - BDE(1) E(G4) + (AC(3) + 2) - GAMB) EN(3,5) + U, O EN(3,6) = NDE(H5) + AC(3) + ADE(1B) + (BDE(B3) + (AC(3) + 2) - GAMA) - BDE(1) E(G4) + (AC(3) + 2) - GAMB) EN(6,1) = EN(3,1) + EXP(-P5) EN(6,3) = EN(3,3) + EXP(-P5) EN(6,4) = EN(3,4) + EXP(-P5) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP66 EKLIP62 EKLIP64 2)*(BDEKLIP65 EKLIP64 EKLIP67 5)*(BJEKLIP69 EKLIP70 EKLIP71 9)*(PDEALIP72 EKLIP75 EKLIP77 |
| EN(2,1)=(AM(4B)+BDE(12)-AM(4P)+BDE(3))+AC(1)+AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)+PDE(15)-AH(4P)+BDE(6))+AC(2)+AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)+PDE(1B)-AM(4P)+BDE(4))+AC(3)+AM(50) EN(2,6)=D,0 EN(2,5)=(A(2,1)+EXP(P4) EN(5,2)=EN(2,1)+EXP(P4) EN(5,2)=EN(2,2)+EXP(P5) EN(5,3)=EN(2,3)+EXP(P5) EN(5,5)=EN(2,5)+CUS(P6) EN(5,5)=EN(2,5)+SIN(P6) EN(3,1)=DDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) IE(B3)+(AC(1)+2)+GAMA) EN(3,2)=EN(2,5)+SIN(P6) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) IE(B3)+(AC(2)+2)+GAMA) EN(3,5)=U,0 EN(3,5)=U,0 EN(3,6)=BUE(U5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) IE(B4)+(AC(3)+2)-GAMB) EN(3,5)=U,0 EN(3,6)=BUE(U5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) IE(B4)+(AC(3)+2)-GAMB) EN(3,5)=U,0 EN(3,6)=BUE(U5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) IE(B4)+(AC(3)+2)-GAMB) EN(3,5)=U,0 EN(3,6)=BUE(U5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) IE(B4)+(AC(3)+2)-GAMB) EN(3,5)=U,0 EN(3,6)=BUE(U5)+AC(3)+ADE(1B)+(BDE(B3)+(AC(3)+2)-GAMA)-BDE(1) IE(B4)+(AC(3)+2)-GAMB) EN(6,1)=EN(3,1)+EXP(-P5) EN(6,4)=EN(3,3)+EXP(-P5) EN(6,5)=-EN(3,6)+EXP(-P5) EN(6,5)=-E | EKLIP52 EKLIP53 EKLIP55 EKLIP56 EKLIP57 EKLIP57 EKLIP59 EKLIP66 EKLIP63 EKLIP65 EKLIP65 EKLIP65 EKLIP65 EKLIP65 EKLIP67 EKLIP70 EKLIP71 9)*(PDEALIP72 EKLIP75 EKLIP76 EKLIP76 EKLIP77 EKLIP78 |
| EN(2,1)=(AM(4B)*BDE(12)-AM(49)*BDE(3))*AC(1)*AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)*PDE(15)-AM(49)*BDE(6))*AC(2)*AM(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)*PDE(1B)-AM(49)*BDE(4))*AC(3)*AM(50) EN(2,5)=(A(2,1)*EXP(P4) EN(5,2)=EN(2,1)*EXP(P4) EN(5,2)=EN(2,2)*EXP(-P4) EN(5,3)=EN(2,3)*EXP(P5) EN(5,4)=EN(2,5)*CUS(P6) EN(5,6)=EN(2,5)*SIN(P6) EN(5,6)=EN(2,5)*SIN(P6) EN(3,1)=DDE(H5)*AC(1)=BDE(3)*(BDE(B4)*(AC(1)*2)*GAMB)*BUE(1) IE(B3)*(AC(1)*2)*GAMA) EN(3,2)=CN(5,1) EN(3,3)=PDE(A5)*AC(2)=HDE(6)*(BDE(B4)*(AC(2)*2)*GAMB)*BUE(1) IE(B3)*(AC(2)*2)*GAMA) EN(3,3)=PDE(A5)*AC(2)=HDE(6)*(BDE(B3)*(AC(3)*2)*GAMB)*BUE(1) IE(B3)*(AC(2)*2)*GAMA) EN(3,5)=U,0 EN(3,5)=U,0 EN(3,5)=U,0 EN(3,1)=EN(3,1)*C(1)*ADE(1B)*(BDE(B3)*(AC(3)*2)*GAMA)-BDE(1) E(0,1)*EN(3,1)*C(P(P5)) EN(6,1)=EN(3,1)*C(P(P5)) EN(6,3)=EN(3,0)*SU*(P5) EN(6,5)==EN(3,0)*SU*(P5) EN(6,5)==EN(3,0)*SU*(P5) EN(6,5)==EN(3,0)*SU*(P6) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP62 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP65 EKLIP69 EKLIP71 9)*(PDEALIP72 EKLIP73 EKLIP75 EKLIP78 EKLIP79 |
| EN(2,1) = (AM(4B) + BDE(12) - AM(49) + BDE(3) + AC(1) + AM(50) EN(2,2) = EN(2,1) EN(2,3) = (AM(4B) + PDE(15) - AM(49) + BDE(6)) + AC(2) + AM(50) EN(2,4) = EN(2,3) EN(2,5) = (AM(4B) + PDE(1B) - AM(49) + BDE(4)) + AC(3) + AM(50) EN(2,6) = 3,0 EN(2,6) = 3,0 EN(2,6) = 5,0 EN(2,6) = 5,0 EN(2,2) = EN(2,2) + EXP(P4) EN(5,2) = EN(2,2) + EXP(P5) EN(5,6) = EN(2,3) + EXP(P5) EN(5,6) = EN(2,5) + CUS(P6) EN(3,6) = EN(2,5) + SUN(P6) EN(3,1) = DDE(H5) + AC(1) - BDE(3) + (BDE(B4) + (AC(1) + 2) + GAMB) + BUE(1) E(B3) + (AC(1) + 2) + SAMA) EN(3,1) = DDE(H5) + AC(2) - HDE(6) + (BDE(B4) + (AC(2) + 2) + GAMB) + BUE(1) E(B3) + (AC(2) + 2) + SAMA) EN(3,3) = PDE(A5) + AC(2) - HDE(6) + (BDE(B4) + (AC(2) + 2) + GAMB) + BUE(1) E(B3) + (AC(2) + 2) + SAMA) EN(3,5) = -EN(3,5) + AC(3) + ADE(1B) + (BDE(B3) + (AC(3) + 2) - GAMA) - BDE(5) EN(5,1) = -EN(1,3) + EXP(P5) EN(6,1) = EN(3,1) + EXP(P5) EN(6,3) = EN(3,6) + SIN(P6) EN(6,5) = -EN(3,6) + SIN(P6) EN(6,6) = EN(3,6) + SIN(P6) | EKLIP52 EKLIP53 EKLIP54 EKLIP56 EKLIP56 EKLIP57 EKLIP59 EKLIP60 EKLIP62 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP66 EKLIP67 5)*(BDEKLIP68 EKLIP70 EKLIP71 9)*(NDEALIP72 EKLIP73 EKLIP74 EKLIP75 EKLIP77 EKLIP77 EKLIP79 EKLIP70 EKL |
| EN(2,1)=(AM(4B)*BDE(12)-AM(49)*BDE(3))*AC(1)*AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)*PDE(15)-AM(49)*BDE(4))*AC(2)*AM(50) EN(2,4)=EN(2,3) EN(2,5)=(N(46)*PDE(18)-AM(49)*BDE(4))*AC(3)*AM(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(5,2)=EN(2,2)*EXP(P4) EN(5,2)=EN(2,2)*EXP(P4) EN(5,3)=EN(2,3)*EXP(P5) EN(5,5)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*EXP(P6) EN(3,1)=DDE(H5)*AC(1)-BDE(3)*(BDE(B4)*(AC(1)*2)*GAMB)*BUE(1) EN(3,1)=DDE(H5)*AC(2)-HDE(6)*(BDE(B4)*(AC(2)*2)*GAMB)*BUE(1) EN(3,3)=DE(A5)*AC(2)-HDE(6)*(BDE(B4)*(AC(2)*2)*GAMB)*BUE(1) E(B3)*(AC(1)*2)*GAMA) EN(3,3)=DE(A5)*AC(2)-HDE(6)*(BDE(B4)*(AC(2)*2)*GAMB)*BUE(1) E(B3)*(AC(2)*2)*GAMA) EN(3,6)=EN(4,5) EN(3,6)=EN(4,5)*AC(3)*ADE(18)*(BDE(B3)*(AC(3)*2)-GAMA)-BDE(1) E(B4)*(AC(3)*2)-GAMB) EN(6,1)=EN(3,1)*EXP(P5) EN(6,3)=EN(3,6)*EXP(P5) EN(6,5)=EN(3,6)*EXP(P5) EN(6,6)=EN(3,6)*U(P6) | EKLIP52 EKLIP53 EKLIP54 EKLIP55 EKLIP56 EKLIP57 EKLIP59 EKLIP60 EKLIP62 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP65 EKLIP67 EKLIP67 EKLIP70 EKLIP71 9)*(RDEALIP72 EKLIP73 EKLIP75 EKLIP77 EKLIP77 EKLIP79 EKLIP70 |
| EN(2,1)=(AM(4B)*BDE(12)-AM(49)*BDE(3))*AC(1)*AH(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(4B)*PDE(15)-AM(49)*BDE(4))*AC(2)*AH(50) EN(2,4)=EN(2,3) EN(2,5)=(AM(4B)*PDE(1B)-AM(49)*BDE(4))*AC(3)*AM(50) EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,6)=0,0 EN(2,2)=EN(2,2)*EXP(P4) EN(5,2)=EN(2,2)*EXP(P5) EN(5,4)=EN(2,3)*EXP(P5) EN(5,4)=EN(2,5)*EXP(P5) EN(5,6)=EN(2,5)*S(P(P6)) EN(5,6)=EN(2,5)*S(P(P6)) EN(3,1)=DDE(H5)*AC(1)-BDE(3)*(BDE(B4)*(AC(1)**2)*GAMB)*BUE(1)) E(B3)*(AC(1)**2)*GAMA) EN(3,1)=DDE(H5)*AC(2)+HDE(6)*(BDE(B4)*(AC(2)**2)*GAMB)*BUE(1)) E(B3)*(AC(2)**2)*GAMA) EN(3,3)=DE(A5)*AC(2)+HDE(6)*(BDE(B3)*(AC(2)**2)*GAMB)*BUE(1)) E(B3)*(AC(2)**2)*GAMA) EN(3,6)=AUE(45)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)**2)-GAMA)-BDE(1))) E(A1)*(A1)*(A2)*GAMA) EN(3,6)=AUE(45)*AC(3)*ADE(1B)*(BDE(B3)*(AC(3)**2)-GAMA)-BDE(1))) E(A1)*(A1)*(A1)*(A1)*(A1)*(A1)*(A1)*(A1)* | EKLIP52 EKLIP53 EKLIP55 EKLIP56 EKLIP57 EKLIP57 EKLIP59 EKLIP66 EKLIP62 EKLIP64 2)*(BDEKLIP65 EKLIP65 EKLIP67 5)*(BJEKLIP68 EKLIP67 EKLIP70 EKLIP71 9)*(NDEALIP72 EKLIP73 EKLIP75 EKLIP75 EKLIP77 EKLIP77 EKLIP78 EKLIP79 EKLIP79 EKLIP79 EKLIP78 EKLIP80 EKLIP80 EKLIP80 EKLIP80 EKLIP80 EKLIP80 |
| EN(2,1)=(AM(46)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(46)+PDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EN(2,5)=(N(2,3)) EN(2,5)=(N(2,1)+EN(2,1)+EN(P4) EN(5,2)=EN(2,1)+EN(2,1)+EN(P4) EN(5,2)=EN(2,2)+EN(P4) EN(5,2)=EN(2,2)+EN(P4) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+CUS(P6) EN(5,6)=EN(2,5)+SIN(P6) EN(3,1)=DDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) E(63)+(AC(1)++2)+GAMA) EN(3,1)=DDE(H5)+AC(2)+HDE(6)+(BDE(B4)+(AC(2)++2)+GAMB)+BDE(1) E(63)+(AC(1)++2)+GAMA) EN(3,3)=PDE(A5)+AC(2)+HDE(6)+(BDE(B4)+(AC(2)++2)+GAMB)+BDE(1) E(63)+(AC(2)++2)+GAMA) EN(3,5)=U,0 EN(3,6)=EN(2,5)+AC(3)+ADE(18)+(BDE(B3)+(AC(3)++2)-GAMB)+BDE(1) E(63)+ADE(45)+AC(3)+ADE(18)+(BDE(B3)+(AC(3)++2)-GAMA)-BDE(4) E(6,1)=EN(3,1)+C(P4) EN(6,3)=FD(3,5)+C(P5) EN(6,3)=EN(3,6)+S(H(P4) EN(6,3)=EN(3,6)+S(H(P4)) EN(6,3)=EN(3,6)+S(H(P4)) EN(6,3)=EN(3,6)+S(H(P4)) EN(6,5)=EN(3,6)+S(H(P4)) EN(| EKLIP52 EKLIP53 EKLIP55 EKLIP56 EKLIP57 EKLIP57 EKLIP59 EKLIP59 EKLIP60 EKLIP61 EKLIP62 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP65 EKLIP67 EKLIP70 EKLIP71 9)*(RDEALIP72 EKLIP73 EKLIP75 EKLIP76 EKLIP77 EKLIP79 EKLIP79 EKLIP79 EKLIP80 EKLIP82W |
| EN(2,1) = 1 AM(46) + BDE(12) - AM(49) + BDE(3) + AC(1) + AM(50) EN(2,2) = EN(2,1) EN(2,3) = 1 AM(40) + PDE(15) - AM(49) + BDE(4) + AC(2) + AM(50) EN(2,4) = EN(2,3) = EN(2,5) = 1 AM(40) + PDE(18) - AM(49) + BDE(4) + AC(3) + AM(50) EN(2,6) = 3, 0 EN(2,5) = EN(2,1) = EXP(P4) EN(5,2) = EN(2,2) = EXP(-P4) EN(5,3) = EN(2,3) + EXP(P5) EN(5,4) = EN(2,3) + EXP(P5) EN(5,4) = EN(2,5) + CUS(P6) EN(5,5) = EN(2,5) + CUS(P6) EN(5,5) = EN(2,5) + SUN(P6) EN(3,1) = BDE(H5) + AC(1) - BDE(3) + (BDE(B4) + (AC(1) + 2) + GAM8) + BDE(1) E(63) + (AC(1) + 2) + GAMA) EN(3,2) = CN(4,5) + AC(2) - HDE(6) + (BDE(B4) + (AC(2) + 2) + GAM8) + BDE(1) E(63) + (AC(2) + 2) + GAMA) EN(3,3) = PDE(H5) + AC(2) - HDE(6) + (BDE(B4) + (AC(2) + 2) + GAM8) + BDE(1) E(63) + (AC(2) + 2) + GAMA) EN(3,4) = - EN(4,3) EN(3,4) = - EN(4,3) + ADE(18) + (BDE(B3) + (AC(3) + 2) - GAMA) - BDE(1) E(64) + (AC(3) + 2) - GAM6) EN(6,1) = EN(3,1) + C(PP4) EN(6,3) = CN(3,3) + C(PP4) EN(6,3) = CN(3,4) + EXP(-P5) EN(6,3) = CN(3,4) + EXP(-P5) EN(6,3) = CN(3,6) + SUN(P6) EN(6,4) = EN(3,6) + (XP(-P5)) EN(6,6) = EN(6,6) + (XP(-P5)) EN(6,6) = | EKLIP52 EKLIP53 EKLIP54 EKLIP56 EKLIP56 EKLIP57 EKLIP57 EKLIP59 EKLIP60 EKLIP62 EKLIP63 EKLIP64 2)*(BDEKLIP65 EKLIP65 EKLIP67 5)*(BDEKLIP65 EKLIP70 EKLIP71 9)*(NDEALIP72 EKLIP73 EKLIP73 EKLIP75 EKLIP77 EKLIP77 EKLIP77 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP82W |
| EN(2,1)=(AM(46)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EN(2,2)=EN(2,1) EN(2,3)=(AM(46)+PDE(15)-AM(49)+BDE(4))+AC(2)+AM(50) EN(2,4)=CN(2,3) EN(2,5)=(AM(46)+PDE(18)-AM(49)+BDE(4))+AC(3)+AM(50) EN(2,6)=3,0 EN(2,6)=3,0 EN(2,6)=3,0 EN(2,2)=EN(2,1)+CXP(P4) EN(5,2)=EN(2,2)+EXP(1-P6) EN(5,3)=EN(2,3)+EXP(P5) EN(5,4)=EN(2,5)+CS(P6) EN(5,6)=EN(2,5)+SIN(P6) EN(3,1)=DDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(1)+2)+GAMB)+BDE(1) EN(3,1)=DDE(H5)+AC(1)-BDE(3)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) EN(3,3)=PDE(A5)+AC(2)-HDE(6)+(BDE(B4)+(AC(2)+2)+GAMB)+BDE(1) E(B3)+(AC(2)+2)+GAMA) EN(3,3)=PDE(A5)+AC(3)+ADE(18)+(BDE(B3)+(AC(3)+2)-GAMB)+BDE(1) E(B3)+(AC(3)+2)-GAMB) EN(3,6)=RU(3,1)+(2)+GAMB) EN(4,1)=EN(3,1)+(2)+GAMB) EN(6,1)=EN(3,1)+(2)+GAMB) EN(6,1)=EN(3,1)+(2)+GAMB) EN(6,1)=EN(3,0)+(2)(P6) EN(6,1)=EN(3,0)+(2)(P6) EN(6,1)=EN(3,0)+(2)(P6) EN(6,1)=EN(3,0)+(2)(P6) EN(6,1)=EN(3,0)+(2)(P6) EN(6,1)=EN(3,0)+(2)(P6) EN(6,1)=EN(3,0)+(2)(P6) EN(6,0)=EN(3,0)+(2)(P6) | EKLIP52 EKLIP53 EKLIP55 EKLIP56 EKLIP57 EKLIP57 EKLIP59 EKLIP60 EKLIP62 EKLIP64 2)*(BDEKLIP65 EKLIP64 EKLIP67 5)*(BDEKLIP68 EKLIP67 EKLIP70 EKLIP71 9)*(RDEALIP72 EKLIP73 EKLIP75 EKLIP75 EKLIP77 EKLIP77 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP79 EKLIP80 EKLIP82W |

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EKLIP83W WRITE (9,4) ((EN(1,J),J=1.7),1=1.6) CALL BINGO (EN.V) MRITE (9,5) (1,V(1),1=1.6) AR(12)=BT(20)/CAPCB-BDE(21)+BDE(49) EKLIP84 EKLIPSSW EKLIPH6 EKLIP87 PP1=AC(1)+ELL/2. PP2=AC(2)+ELL/2. EKLIPAS PP3=AC(3)+ELL/2. EKLIP89 CALL CHECKS (V.AC. PP1. PP2. PP3) MRITE (9.5) (1. V(1), 1=1.0) EKLIP90 EKLIP91W EKLIP92 FEL 1P93 AL(1)=-BOE(3)+V(1) AL(2)=BDE(3)+V(2) FKI 1094 EKL1P95 AL(3) =- POE(6) +V(3) EKL 1P96 AL (4) = BUE (6) + V(4) EKLIP97 AL (51=BOE (9) + V(6) EKLIPHE AL (6)=-80E(9)+V(5) EKLIP94 EKLIP AL (7)=BOE(12)+V(1) EKLIP AL(8) =- POE(12) + V(2) EKLIP AL (9) =805(15)+V:3) EKLIP AL (10) =- HOE(15) + V(4) EKLIP AL(11) =- BDE(1a) + V(6) EKLIP AL(12)=80E(15)+V(5) WRITE (9,6) WRITE (9,7) (AL(1),[=1,12) EKLIP EKLIP EKLIP EKLIP 00 1 KF=1-11 EKLIP X=DELPH(KF) EKLIP PI=AC(1)+X EKLIP #2=A:(2)*X P3=AC(3)+X EKLIP EKLIP WW=V(1)+EXP(P1)+V(2)+EXP(-P1)+V(3)+EXP(P2)+V(4)+EXP(-P2)+V(5)+CUS(EKL1P 1P31+V(6)+S14(P3)+805(49) EKLIP DWW=V(1)+8DE(101)+V(2)+8DE(111)+V(3)+8DE(161)+V(4)+8DE(171)+V(5)+8EKL(P EKLIP 1DE (221) + V(6) + 305 (231) DOWN=V(1)*9UE(102)+V(2)*BJE(112)+V(3)*BDE(162)+V(4)*BDE(172)+V(5)*EKLIP 180E(222)+V(6)+H0E(232) FRIIP WB=AL(1)+EXP(P1)+AL(2)+EXP(-P1)+AL(3)+EXP(P2)+AL(4)+EXP(-P2)+AL(5)EKL(P 1+COS(P31+AL(6)+S14(P3) EKL 1P DWB=AL(1)+HUE(1)1+AL(2)+BDE(111)+AL(3)+BDE(161)+AL(4)+BDE(171)+ALEKLIP 1(5)+BDE(221)+AL(6)+RUE(231) EKLIP DDW9=AL(1)*RUE(1)2)*AL(2)*BCE(112)*AL(3)*BDE(162)*AL(4)*ADE(172)*AEKL1P EKLIP 1L(5)+BDE(222)+AL(5)+BDE(232) DDDW8=AL(1)+HUE(103)+AL(2)+BOE(113)+AL(3)+BOE(163)+AL(4)+HUE(173)+EKL1P 1AL (5) + BUE (223) + AL (6) + BUE (233) EKLIP EKLIP WA=AL(7) * EXP(P1) + AL(A) * EXP(-P1) + AL(9) * EXP(*2) + AL(10) * EXP(-P2) + AL(1EKL1P 11)+COS(P3)+4L(12)+S[N(P3) EKLIP DWA=AL(7)+80E(101)+AL(8)+R0E(111)+AL(9)+8DE(161)+AL(10)+8DE(171)+AEKL1P EKLIP 1L(11)+BDE(221)+AL(12)+BDE(231) DOWA=AL(7)+BJE(102)+AL(0)+805(112)+AL(9)+806(162)+AL(10)+806(172)+64L(P 1AL(11)+80E(222)+AL(12)+80E(232) EKLIP DODWA+AL(7)+AUE(1)3)+AL(1)+AUE(1)3)+AL(9)+ADE(163)+AL(10)+BDE(173)EKLIP 1+AL(11)+RDE(223)+AL(12)+CDE(233) EKLIP EKLIP EKLIP 1211/AC(2)+(V(5)+SI'I(P3)-V(6)+COS(P3))/AC(3)+BUE(44)+X SKLIP EF IX.EU.-ELL/2.) CALL UCOFF (FNTHW.CONST) EKLIP MU=-RDE(19)+WA-BDE(20)+WB-BDE(21)+FNTWW+(BT(20)/CAPCB)+X+CUNST

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| DWU ==BDE(19)+DWA=BDE(20)+DWA=BDE(21)+WW+BT(20)/CAPCB | EKLIP | |
|--|----------|---|
| DDwuADE(19)+DDwA-BDE(20)+DDwB-BDE(21)+Dww | EKLIP | |
| DD0wu=-BDE(19)+DD0wA-BDE(20)+DD0wB-B0E(21)+DDww | EKLIP | |
| TAU-LOAD1-BUE(22)+DOWU-BDE(23)+DWW | EXLIP | |
| BTAUADE(22)+0000WU-BDE(23)+000WW | EKLIP | |
| NO.J. 1 0402-805 (24) 800048-805 (25) 807 414 805 (23) 80414805 (26) 844 | FELTP | |
| | ERI TP | |
| | | |
| | ENLIP | |
| GAT(HA/12, JTIAU CANAT(WATOWA) | EALIF | |
| GS-(HB/12. J-TAU-GANA-(WB-DRW) | EKLIP | |
| F 0=0A+08 | EKLIP | |
| WRITE (9,6) QA,Q8,FQ | EKLIP | W |
| IF (X.EQ.ABS(ELL/2.)) CALL VINSON (X,EA,EB,MA,MB,G3A,G3B,FNXB) | EKLIP | |
| 1 CONTINUE | EKLIP | |
| RETURN | EKLIP | |
| | EKLIP | |
| 2 FORMAT (1X-9HADE ARE /(10E12-5)) | EKLIP | |
| B FORMAT (11, 20H FN(1, 1) ARE | EKLIP | |
| A BORNAT (11, 751). A) | FRLIP | |
| R RANAT (ALV. SWITT. SUI-ELS & //////. SWITT. SWITT. SU | | |
| A ROAME 1 1411472041142077-2126377211492041117207-21263777 | ENLIP | |
| • FURNAT LIA, ZUN ALILI ARE | ENLIP | |
| 7 FURNAI (6612.3) | ENLLF | |
| • FORMAT (11, SHQA*E12, 5, 2X, SHQB*E12, 5, 2X, SHQBAR*E12, 5/) | EKLIP | |
| END | EKLIP | |
| SUBROUTINE EKLIP6 | | L |
| DIMENSION JIP(11) | EKLIP | 2 |
| COMMON DLTEMP | EKLIP | 3 |
| COMMON TEMP.EA.EAC.NUA.NUAC.EB.EBC.NUB.NUBC.HA.HB.R.G3A.G3B.CA.C | B, EKLIP | 4 |
| 104-08-H.CASB.CAPSB.NUNU.GAMA.GAMB.K(40).A(55).G(7).ST(30).FVTCA. | FNERLER | 5 |
| 2108.0DE(600).LOADI.AM(50).LOAD2.EN(6.7).FNXA.FNXB.FMXA.FMXB.FNX. | FREKLIP | |
| SE .F NCA .F NOB .AC 13) .KL IP .ELL .DEL PH(20) .V(6) .AL(18) . W. DW. CDW. WB. | DWEKLIP | 7 |
| 48-DOWA-DOOWA-WA-DWA-WU-DOWU-DODWU-TAU-DTAU-WPWA-DWWA-WUA- | OWEKLIP | |
| G (A) | Ext IP | 9 |
| BEAL MUA. MUAT. MIR. MIR. MIR. MIMI. M. LOADT. LOADT | ERLIP1 | 6 |
| | ENLIP'S | Ň |
| LASE OF TIMEE REAL ROOTSTONE ONLY FUSITIVE | ENLIPI | |
| | ERLIPL | - |
| BDE(2)=A(4]) (AC([)) (AC(()) (AC(()) (AC(()) (AC(()) (AC(()) (| ERLIPI | 3 |
| BDE(3)=6DE(1)/8DE(2) | EKLIPI | • |
| | EKLIPI | 5 |
| BDE(4)=A(44)=(AC(2)=+3)+A(45)=AC(2) | EKLIPI | 6 |
| BDE(5)=A(41)+(AC(2)++4)+A(42)+(AC(2)++2)+A(43) | EKLIPI | 7 |
| SDE(6)=SDE(4)/SDE(5) | EKLIPI | U |
| | EKLIPI | 9 |
| BDE(7)-A(44)+(AC(3)++3)+A(45)+AC(3) | EKLIP2 | 0 |
| @DE(8)=A(4))+(AC(3)+++)+A(42)+(AC(3)++2)+A(43) | EKLIP2 | 1 |
| ADE(9)-BOE(7)/ADE(4) | EKLIP2 | 2 |
| | EKLIP2 | ī |
| ADF(10)-ADF(3)+(A(2))+(AC(1))++A(22))-A(24)+A(2)1 | | 6 |
| | 641102 | |
| | Sel 183 | |
| | Bri Ins | , |
| | ENLIPZ . | - |
| | ENLIPZ. | |
| | EKLIP2 | 7 |
| 807(1))+80E(1)/80E(14) | EKLIP3 | 0 |
| | EKLIPS | L |
| BDE(16)+BDE(+)+(A(21)+(AC(3)++2)+A(22))+A(24)+AC(3) | EKLIP3. | 2 |
| BDE(17)=4(25)+(AC(3)++2) | EKLIP3 | 3 |
| BDE(18)=80E(16)/80E(17) | EKL1P3 | 4 |
| | EKLIP3 | 5 |
| | EKLIP3 | 6 |
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P4=AC(1)+ELL EKLIP37 P5=AC(2)+ELL EKLIP38 P6=AC(3)+ELL EKLIP39 EKLIP40 EN(1,1)=(AM(44)+BDE(12)-AM(45)+BDE(3))+AC(1)+AM(46) EKLIP41 EN(1,2)=EN(1,1) EKLIP42 EN(1,3)=(AH(44)+RDE(15)-AN(45)+BDE(6))+AC(2)+AN(46) EKLIP43 EN(1,4)=EN(1,3) EKLIP44 EKLIP45 EN(1,5)=(AM(44)+RDE(18)-AM(45)+BDE(9))+AC(3)+AM(46) EN(1,6)=EN(1,5) EKLIP46 EKLIP47 EN(4,1)=EN(1,1)=EXP(P4) EKLIP48 EN(4,2)=EN(1,2)+EXP(-P4) EKLIP49 EN(4,3)=EN(1,3)+EXP(P5) EKLIP50 EN(4,4)=EN(1,4)=EXP(-P5) EKLIP51 EN(4,5)=EN(1,5)+EXP(P6) EKLIP52 EN(4+6)=EN(1+6)*EXP(-P6) EKLIP53 EKL IP54 EN(2,1)=(AM(46)+BDE(12)-AM(49)+BDE(3))+AC(1)+AM(50) EKL1P55 EN(2,2)=EN(2,1) EKLIPSO EN(2.3)=(AM(48)+BDE(15)-AM(49)+BDE(6))+AC(2)+AM(50) EKLIP57 EN(2,4)=EN(2,3) EN(2,5)=(AN(48)+EDE(18)-AN(49)+BDE(9))+AC(3)+AH(50) EKL IPS8 EKL IP59 EN(2,6)=EN(2,5) EKL IP60 EKLIP61 EN(5,1)=EN(2,1)=EXP(P4) EKL 1P62 EN(5,2)=EN(2,2)+EXP(-P4) EKL 1P63 EN(5,3)=EN(2,3)+EXP(P5) EKLIP64 EN(5,4)+EN(2,4)+EXP(-P5) EKLIP65 EN(5,5)=EN(2,5)+EXP(P6) EKLIP66 EN(5,6)=EN(2,6)=EXP(-P6) EKLIP67 EKL IP68 EN(3,1)=DDE(85)+AC(1)-BDE(3)+(BDE(84)+(AC(1)++2)+GAMB)+BDE(12)+(BDEKL1P69 EKLIP70 1E(83)+(AC(1)++2)+GAMA) EN(3,2)=EN(3,1) EKLIP71 EN(3,3)=CDE(85)+AC(2)-RDE(6)+(8UE(84)+(AC(2)++2)+GA48)+BDE(15)+(8DEKL1P72 1E(83)+(AC(2)++2)+GAMA) EKLIP73 EN(3,4)=-EN(3,3) EKLIP74 EN(3,5)*BUE(85)*AC(3)-BDE(9)*(BDE(84)*(AC(3)**2)+GAMB)*BDE(18)*(RDEKL:P75 EKLIP76 1E(83)+(AC(3)++2)+GAMA) EN(3.6)=-EN(3.5) EKLIP77 EKLIP78 EN(6,1)=EN(3,1)=EXP(P4) EKLIP79 EN(6,2)=EN(3,2)+EXP(-P4) EKLIPHO EN(6,3)=EN(3,3)*EXP(P5) EKLIP81 EN(6,4)=EN(3,4)+EXP(-P5) EKL IP82 EN(6,5)=EN(3,5)=EXP(P6) EKL [P83 EN(6,6)=EV(3,6)=EXP(-P6) EKLIP84 EKLIP85 EKLIP86 AL(1)=-80E(3)+V(1) EKLIP87 AL(2)=80E(3)+V(2) EKLIPBE EKLIP89 AL(3)=-8DE(6)+V(3) EKL IP90 AL(4)=BUE(6)+V(4) EKLIP91 EKLIP92 AL(5)=-BDE(9)=V(5) EKLIP93 EKLIP94 AL(6)=BDE(9)+V(6) EKL IP95

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EKL IP96

| | AL(7)-8DE(12)+V(1) | 1 | EKLI | P97 |
|---|--|-------|-------|----------|
| | AL(8) =- 8DE(12) + V(2) | | EKLE | P98 |
| | | | EKLI | P99 |
| | AL(9)=8DE(15)+V(3) | | EKL I | • |
| | AL(10)=-BDE(15)+V(4) | | EKLI | • |
| | | 1 | EKLI | • |
| | AL(11)=8DE(18)=V(5) | | EKLI | • |
| | AL(12)=-80E(18)=Y(6) | | KLI | • |
| | | | KLI | • |
| | NU-VE110FXP(P1)+V(2)+EXP(-P1:+V(3)+FXP(P2)+V(4)+EXP(-P2)+V(5)+E | XPLE | KLI | 9 |
| 1 | 1931+V(A) 4FXP(-93)+80F(49) | 1 | KLI | P |
| - | DYU-W(1)ABDE(10) + V(2) BBDE(11) + V(3)BBDE(14) + V(4)BBDE(17) + V(5 | 1+85 | KLT | P |
| 1 | | F | KL I | P |
| - | DOUGLAUNT LANSE 1102144/214405/112144/314805/162144/414805/172144/ | 5146 | KI I | 9 |
| • | | - | | |
| - | BBUELE 42/4 4 (0) * DUE (2)2/ NB-AL (1) 46 40/01 (A) 45 46 40 (B) 4AL (A) 45 46 40 (B) 4AL (A) 45 46 40 (B) 4AL | 1516 | RA E | |
| | HOPAL11/*CAPIF1/*AL12/*CAF1-F1/*AL13/*CAF1F2/*AL1*/*LAF1-F2/*AL | | | 1 |
| - | | | NL I | |
| | | TALC | NL. | - |
| 2 | 17777005167117AL10770216717 | 1.4.4 | NL. | |
| | DUWS=AL(1)=AJ(1)=AJ(2)=AL(2)=AL(3)=BUE(102)=AL(4)=BUE(1/2 | 1440 | KLI | 2 |
| | IL (5) # BDE (BDE (242) + AL (6) # BDE (252) | | KLI | <u> </u> |
| | DDW6=AL(1)+BDE(103)+AL(2)+EDE(113)+AL(3)+BDE(103)+AL(4)+BDE(17 | 51+6 | KLI | |
| 1 | IAL(5) + BDE(243) + AL(6) + BDE(253) | E | KLI | |
| | | E | KLI | P |
| | WA=AL(7)*EXP(P1)*AL(8)*EXP(-P1)*AL(9)*EXP(P2)*AL(10)*EXP(-P2)*A | | KLI | P |
| 1 | 1)+EXP(P3)+AL(12)+EXP(-P3) | E | KLI | 2 |
| | DWA=AL(7)+#9E(101)+AL(8)+#DE(111)+AL(9)+BDE(161+AL(10)+BDE(171 |)+AE | KLT | P |
| 1 | 1L(11)+BDE(241)+AL(12)+BDE(251) | E | KLI | P |
| | DDWA=AL(7)+8DE(102)+AL(8)+8DE(112)+AL(9)+8DE(162)+AL(10)+8DE(17 | 21+E | KLI | P |
| 1 | IAL(11)+BUE(242)+AL(12)+BDE(252) | E | KLI | P |
| | DDDwA=AL(7)+8UE(103)+AL(3)+8UE(113)+AL(9)+8DE(163)+AL(10)+8DE(1 | 73)E | KLI | P |
| 1 | L+AL(11)+BDE(243)+AL(12)+8UE(253) | E | KLI | 9 |
| | FN7ww=(V(1)+EXP(P1)-V(2)+EXP(-P1))/AC(1)+(V(3)+EXP(P2)-V(4)+EXP | (-PE | KLI | P |
| 1 | 12])/AC(2)+(V(5)+EXP(P3)-V(6)+EXP(-P6))/AC(3)+BDE(49)+X | E | KLI | P |
| | IF (X.EQELL/2.) CALL UCOFF (FNTWW,CONST) | E | KLI | P |
| | WU=-BDE(19)+WA-BDE(20)+WB-BDE(21)+FNTWW+(BT(20)/CAPCB)+X+CONST | E | KLI | P |
| | DWU=-BDE(14)+DWA-BDF(20)+DWB-BDE(21)+WW+BT(20)/CAPCB | E | KLI | P |
| | ODHU=-BDE(14)+DDWA-RDE(2)+DDWB-RDE(21)+UWW | E | KLI | P |
| | DDDWU=-80E(19)+000WA-RDE(20)+00DW8-80E(21)+00WW | E | KLI | P |
| | TAU=L CAD1-BOE(22)=DUWU-BDE(23)=OWW | E | KLI | P |
| | OTAU=-80E1221+000+U-80E1231+000WW | E | KLI | P |
| | WPJ=LC402-BUE(24)+DODW8-BDE(25)+DTAU+BDE(23)+DWU+BDE(26)+WW | E | KLI | P |
| | | E | KLI | • |
| | CALL RESULT (X) | Ē | KL I | P |
| | CALL PRINT (X) | . F | KL E | 0 |
| | RETURN | Ē | KL T | |
| | FND | | KA BI | |
| | SUBROUTINE DIFE (PL.P2.P3) | | - | |
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(P2) = DE (134) = EXP (P2) = DE (134) = EXP (P2) = DE (135) = EXP (P2) = DE (135) = EXP (P2) = DE (144) = -EXP (-P2) = DE (151) = -EXP (-P2) = DE (152) = -EXP (-P2) = DE (153) = EXP (-P2) = DE (153) = EXP (-P2) = DE (153) = -EXP (-P2) = DE (154) = -EXP (-P2) = DE (154) = -EXP (-P2) = DE (161) = AC (2) = EXP (-P2) = DE (154) = AC (2) = EXP (-P2) = DE (161) = AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (1) = AC (2) = EXP (-P2) = DE (174) = (AC (2) = EXP (-P2) = DE (174) = (AC (2) = EXP (- | DE (111) =-AC (1) • EX DE (111) =-AC (1) • EX DE (112) =-BDE (112) DE (113) =-BDE (113) DE (114) =-BDE (113) DE (121) = EXP (P2) • (DE (122) = EXP (P2) • (DE (123) = EXP (P2) • (DE (124) = EXP (P2) • (DE (131) = EXP (P2) • (DE (132) = EXP (P2) • (DE (133) = EXP (P2) • (DE (134) = EXP (P2) • (DE (134) = EXP (P2) • (DE (142) = EXP (P2) • (DE (142) = EXP (P2) • (DE (142) = EXP (P2) • (DE (151) = EXP (P2) • (DE (152) = EXP (P2) • (DE (153) = EXP (P2) • (DE (161) = AC (2) • BDE DE (162) = AC (2) • BDE DE (163) = AC (2) • BDE DE (164) = AC (1) • BDE DE (174) = -AC (1) • ST DE (181) = -AC (1) • ST DE (192) = - (AC (1) • C DE (192) = - (AC (1) • C DE (193) = - (AC (1) • C DE (194) = (AC (2) • S DE (201) = -AC (2) • S DE | DE (104) = BDE (103) = A DE (111) = -AC (1) = EXP DE (112) = ADE (111) = DE (113) = -BDE (113) = DE (114) = -BDE (113) = DE (121) = EXP (P2) = (A DE (122) = EXP (P2) = (A DE (123) = EXP (P2) = (A DE (124) = EXP (P2) = (A DE (132) = EXP (P2) = (A DE (132) = EXP (P2) = (A DE (132) = EXP (P2) = (A DE (133) = EXP (P2) = (A DE (134) = EXP (P2) = (A DE (135) = EXP (P2) = (A DE (141) = -EXP (-P2) = (A DE (144) = EXP (P2) = (A DE (144) = EXP (-P2) = (A DE (144) = EXP (-P2) = (A DE (151) = -EXP (-P2) = (A DE (152) = -EXP (-P2) = (A DE (153) = EXP (-P2) = (A DE (153) = EXP (-P2) = (A DE (154) = AC (2) = BDE (12) = (A DE (161) = AC (2) = BDE (12) = (A DE (163) = AC (2) = BDE (12) = (A DE (171) = -AC (2) = BDE (12) = (A DE (173) = -AC (2) = BDE (12) = (A DE (174) = -AC (1) = S1 DE (174) = -AC (1) = S1 DE (192) = (AC (1) = S1) = (A DE (192) = (AC (1) = | DE (104) = BDE (103) = AC DE (111) = -AC (1) = EXP(DE (112) = BDE (111) = A DE (113) = -BDE (111) = A DE (114) = -BDE (113) = A DE (121) = EXP(P2) = (AC DE (122) = EXP(P2) = (AC DE (123) = EXP(P2) = (AC DE (124) = EXP(P2) = (AC DE (131) = EXP(P2) = (AC DE (132) = EXP(P2) = (AC DE (132) = EXP(P2) = (AC DE (133) = EXP(P2) = (AC DE (133) = EXP(P2) = (AC DE (143) = EXP(P2) = (AC DE (143) = EXP(P2) = (AC DE (143) = EXP(P2) = (AC DE (144) = EXP(P2) = (AC DE (151) = EXP(P2) = (AC DE (151) = EXP(P2) = (AC DE (152) = EXP(P2) = (AC DE (153) = EXP(P2) = (AC DE (153) = EXP(P2) = (AC DE (154) = AC (2) = BDE (120) DE (154) = AC (2) = BDE (120) DE (161) = AC (1) = SIN(10) DE (163) = AC (1) = SIN(10) DE (164) = (AC (1) = SIN(10)) DE (164) = (AC (1) = SIN(10)) DE (193) = (AC (1) = SIN(10) | DE (104) = BDE (103) = AC (DE (111) = -AC (1) = EXP(- DE (112) = ADE (111) = AC DE (113) = -BDE (113) = AC DE (114) = -BDE (113) = AC DE (121) = EXP(P2) = (AC (DE (122) = EXP(P2) = (AM (DE (123) = EXP(P2) = (AM (DE (124) = EXP(P2) = (AM (DE (131) = EXP(P2) = (AM (DE (132) = EXP(P2) = (AM (DE (133) = EXP(P2) = (AM (DE (134) = EXP(P2) = (AM (DE (144) = EXP(P2) = (AM (DE (151) = EXP(P2) = (AM (DE (152) = -EXP(-P2) = (A DE (153) = EXP(P2) = (A DE (153) = EXP(P2) = (A DE (153) = EXP(P2) = (A DE (154) = AC (2) = BDE (16 DE (154) = AC (2) = BDE (16 DE (162) = AC (2) = BDE (16 DE (164) = AC (2) = BDE (16 DE (174) = -AC (2) = BDE (17 DE (174) = -AC (1) = SIN(P) DE (174) = -AC (2) = SIN(P) DE (174) = -AC | DE (104) = BDE (103) = AC (1 DE (111) = -AC (1) = EXP(-P DE (112) = ADE (111) = AC (DE (113) = -BDE (113) = AC (DE (114) = -BDE (113) = AC (DE (121) = EXP(P2) = (AC (2 DE (122) = EXP(P2) = (AC (3 DE (123) = EXP(P2) = (AC (3 DE (131) = EXP(P2) = (AC (3 DE (132) = EXP(P2) = (AC (3 DE (132) = EXP(P2) = (AC (3 DE (133) = EXP(P2) = (AC (3 DE (134) = EXP(P2) = (AC (3 DE (144) = EXP(P2) = (AC (3 DE (144) = EXP(P2) = (AC (4 DE (153) = EXP(P2) = (AC (4) DE (163) = AC (2) = DE (163) DE (173) = -AC (1) = SIN(P1) DE (181) = -AC (1) = SIN(P1) DE (183) = (AC (1) = SIN(P1) DE (193) = -(AC (1) = SIN(P2) = SIN DE (193) = -(AC (1) = SIN(P2) = SIN DE (193) = -(AC (1) = SIN(P2) = SIN DE (193) = -(AC (1) = SIN(P2) | DE (104) + BDE (103) + AC(1) DE (111) = -AC(1) + EXP(-P1 DE (112) = ADE (111) + AC(1) DE (113) = -BDE (112) + AC(1) DE (114) = -BDE (113) + AC(1) DE (121) = EXP(P2) + (AC(2)) DE (122) = EXP(P2) + (AC(3)) DE (123) = EXP(P2) + (AC(3)) DE (124) = EXP(P2) + (AC(3)) DE (132) = EXP(P2) + (AC(3)) DE (133) = EXP(P2) + (AC(3)) DE (133) = EXP(P2) + (AC(3)) DE (134) = EXP(P2) + (AC(4)) DE (144) = EXP(P2) + (AC(4)) DE (151) = + EXP(-P2) + (AC(4)) DE (152) = - EXP(-P2) + (AC(4)) DE (153) = + EXP(-P2) + (AC(4)) DE (153) = + EXP(-P2) + (AC(4)) DE (154) = + EXP(-P2) + (AC(4)) + EXP(-P2) + | DE (104) = BDE (103) = AC(1) DE (111) = -AC(1) = EXP(-P1) DE (112) = ADE (111) = AC(1) DE (113) = -BDE (113) = AC(1) DE (114) = -BDE (113) = AC(1) DE (121) = EXP(P2) = (AC(2) = DE (122) = EXP(P2) = (AC(3) = DE (123) = EXP(P2) = (AC(3) = DE (124) = EXP(P2) = (AC(3) = DE (131) = EXP(P2) = (AC(3) = DE (143) = EXP(P2) = (AC(3) = DE (143) = EXP(P2) = (AC(3) = DE (144) = EXP(-P2) = (AC(3) = DE (151) = EXP(-P2) = (AC(3) = DE (152) = EXP(-P2) = (AM(5) = DE (151) = EXP(-P2) = (AM(5) = DE (152) = EXP(-P2) = (AM(5) = DE (153) = EXP(-P2) = (AM(5) = DE (153) = EXP(-P2) = (AM(5) = DE (161) = AC(2) = DE (161) = DE (162) = AC(2) = DE (161) = DE (163) = AC(2) = DE (163) = DE (161) = AC(1) = SIN(P1) = DE (163) = AC(1) = SIN(P1) = DE (164) = (AC(1) = SIN(P1) = DE (164) = (AC(1) = SIN(P1) = DE (164) = (AC(1) = SIN(P2) = DE (174) = (AC(2) = SIN(P2) = D | DE (104) = BDE (103) *AC(1) DE (111) = AC (1) *E XP(-P1) DE (112) = BDE (111) *AC(1) DE (113) = GDE (112) *AC(1) DE (114) = BDE (113) *AC(1) DE (121) = E XP (P2) * (AC (2) *C DE (122) = E XP (P2) * (AC (3) *C DE (123) = E XP (P2) * (AM (3) *C DE (132) = E XP (P2) * (AM (5) *C DE (132) = E XP (P2) * (AM (5) *C DE (132) = E XP (P2) * (AM (5) *C DE (132) = E XP (P2) * (AM (5) *C DE (132) = E XP (P2) * (AM (6) *C DE (132) = E XP (P2) * (AM (6) *C DE (133) = E XP (P2) * (AM (6) *C DE (134) = E XP (P2) * (AM (6) *C DE (134) = E XP (-P2) * (AC (2) *C DE (151) = *E XP (-P2) * (AC (3) *C DE (152) = E XP (-P2) * (AM (6) *C DE (152) = E XP (-P2) * (AM (6) *C DE (153) = *E XP (-P2) * (AM (6) *C DE (153) = *E XP (-P2) * (AM (6) *C DE (153) = *E XP (-P2) * (AM (6) *C DE (153) = *E XP (-P2) * (AM (6) *C DE (153) = *C XP (-P2) * (AM (6) *C DE (153) = *C (2) * BD E (153) DE (153) = *C (2) * BD E (163) DE (153) = AC (2) * BD E (163) DE (161) = AC (2) * E XP (P2) DE (162) = AC (2) * BD E (163) DE (171) = AC (2) * BD E (173) DE (173) = AC (2) * BD E (173) DE (174) = AC (1) * SIN(P1) DE (181) = -AC (1) * SIN(P1) DE (181) = -AC (1) * SIN(P1) DE (181) = -AC (1) * SIN(P1) DE (183) = (AC (1) * 3) * SIN(P) DE (193) = -(AC (1) * SIN(P2) DE (194) = (AC (1) * SIN(P2)) DE (1201) = AC (2) * SIN(P2) | DE (104) = BDE (103) = AC (1) DE (111) = -AC (1) = EXP(-P1) DE (112) = ADE (111) = AC (1) DE (113) = -6DE (113) = AC (1) DE (114) = -BDE (113) = AC (1) DE (121) = EXP(P2) = (AC (2) = CO DE (122) = EXP(P2) = (AC (3) = CO DE (123) = EXP(P2) = (AC (3) = CO DE (124) = EXP(P2) = (AC (3) = CO DE (132) = EXP(P2) = (AC (3) = CO DE (133) = EXP(P2) = (AC (3) = CO DE (133) = EXP(P2) = (AC (3) = CO DE (133) = EXP(P2) = (AC (2) = CO DE (141) = -EXP(P2) = (AC (2) = CO DE (143) = -EXP(P2) = (AC (2) = CO DE (143) = -EXP(P2) = (AC (3) = CO DE (144) = +EXP(P2) = (AC (3) = CO DE (151) = +EXP(P2) = (AC (3) = CO DE (152) = -EXP(P2) = (AC (3) = CO DE (153) = +EXP(P2) = (AC (3) = CO DE (153) = +EXP(P2) = (AC (3) = CO DE (162) = AC (2) = CO = (AC (3) = CO DE (162) = AC (2) = CO = (AC (3) = CO DE (162) = AC (2) = CO = (AC (3) = CO DE (162) = AC (2) = CO = (AC (3) = CO DE (163) = AC (2) = CO = (AC (3) = CO DE (163) = AC (2) = CO = (AC (3) = CO DE (163) = AC (2) = CO = (AC (3) = CO DE (171) = -AC (2) = CO = (AC (1) = CO DE (173) = -AC (2) = CO = (P2) DE (173) = -AC (2) = CO = (P1) DE (173) = -AC (1) = CO = (P1) DE (173) = -AC (2) = SIN(P1) DE (174) = -AC (2) = SIN(P1) DE (174) = -AC (2) = SIN(P2) DE (174) = -AC (2) = SIN(P2) DE (174) = -AC (2) = SIN(P2) | DE (104) - BDE (103) *AC(1) DE (111) - AC (1) * EXP(-P1) DE (112) - BDE (111) *AC(1) DE (113) - BDE (113) *AC(1) DE (114) - BDE (113) *AC(1) DE (121) - EXP(P2) * (AC(2) *COS DE (122) - EXP(P2) * (AC(1) *COS DE (123) - EXP(P2) * (AC(3) *COS DE (123) - EXP(P2) * (AC(3) *COS DE (131) - EXP(P2) * (AC(3) *COS DE (132) - EXP(P2) * (AC(3) *COS DE (133) - EXP(P2) * (AC(3) *COS DE (133) - EXP(P2) * (AC(3) *COS DE (134) - EXP(P2) * (AC(3) *COS DE (134) - EXP(P2) * (AC(3) *COS DE (134) - EXP(P2) * (AC(3) *COS DE (144) - EXP(P2) * (AC(3) *COS DE (144) - EXP(P2) * (AC(3) *COS DE (151) - EXP(-P2) * (AC(3) *COS DE (152) - EXP(-P2) * (AC(3) *COS DE (153) - AC(2) * DE (153) DE (153) - AC(2) * DE (153) DE (153) - AC(2) * DE (153) DE (153) - AC(1) * SIN(P1) DE (154) - AC(2) * SIN(P2) | DE(1104) - BDE(103) *AC(1) DE(111) - AC(1) * XP(-P1) DE(112) - BDE(111) *AC(1) DE(113) - GDE(112) *AC(1) DE(114) - BDE(113) *AC(1) DE(121) - EXP(P2) * (AC(2) *COS(DE(122) - EXP(P2) * (AC(3) *COS(DE(123) - EXP(P2) * (AM(3) *COS(DE(132) - EXP(P2) * (AM(4) *COS(DE(132) - EXP(P2) * (AM(4) *COS(DE(133) - EXP(P2) * (AM(4) *COS(DE(133) - EXP(P2) * (AM(4) *COS(DE(133) - EXP(P2) * (AM(4) *COS(DE(134) - EXP(P2) * (AM(4) *COS(DE(134) - EXP(P2) * (AM(4) *COS(DE(142) - EXP(P2) * (AM(4) *COS(DE(144) - EXP(P2) * (AM(4) * COS(DE(144) - EXP(P2) * (AM(4) * COS(DE(144) - EXP(P2) * (AM(5) * COS(DE(151) - AC(2) * EXP(P2) DE(153) - EXP(P2) * (AM(6) * COS(DE(151) - AC(2) * DE(151) DE(153) - AC(2) * DE(151) DE(153) - AC(2) * DE(151) DE(153) - AC(2) * DE(151) DE(174) - AC(2) * DE(173) DE(174) - AC(2) * DE(173) DE(174) - AC(2) * DE(173) DE(174) - AC(1) * SIN(P1) DE(173) - AC(2) * DE(173) DE(184) - (AC(1) * 3) * SIN(P1) DE(192) - (AC(1) * 3) * SIN(P1) DE(193) - (AC(1) * SIN(P2)) DE(194) - AC(2) * SIN(P2) | DE (104) = BDE (103) = AC (1) DE (112) = AC (1) = EXP(-P1) DE (112) = ADE (111) = AC (1) DE (113) = -6DE (112) = AC (1) DE (114) = BDE (113) = AC (1) DE (121) = EXP (P2) = (AC (2) = COS (P) DE (122) = EXP (P2) = (AC (3) = COS (P) DE (123) = EXP (P2) = (AC (3) = COS (P) DE (124) = EXP (P2) = (AC (3) = COS (P) DE (132) = EXP (P2) = (AC (3) = COS (P) DE (133) = EXP (P2) = (AC (3) = COS (P) DE (133) = EXP (P2) = (AC (2) = COS (P) DE (133) = EXP (P2) = (AC (2) = COS (P) DE (134) = EXP (P2) = (AC (2) = COS (P) DE (144) = EXP (P2) = (AM (5) = COS (P) DE (144) = EXP (P2) = (AM (5) = COS (P) DE (144) = EXP (P2) = (AM (5) = COS (P) DE (152) = EXP (P2) = (AM (5) = COS (P) DE (152) = EXP (P2) = (AM (5) = COS (P) DE (152) = EXP (P2) = (AM (5) = COS (P) DE (152) = EXP (P2) = (AM (5) = COS (P) DE (153) = EXP (P2) = (AM (5) = COS (P) DE (161) = AC (2) = EXP (P2) DE (162) = AC (2) = DE (161) DE (163) = AC (2) = DE (161) DE (163) = AC (2) = DE (161) DE (163) = AC (2) = DE (161) DE (171) = AC (2) = EXP (P2) DE (172) = AC (2) = DE (173) DE (174) = AC (1) = SIN(P1) DE (174) = AC (1) = SIN(P1) DE (184) = (AC (1) = SIN(P1) DE (184) = (AC (1) = SIN(P1) DE (192) = (AC (1) = SIN(P2) | DE (1104) * BDE (103) * AC(1) DE (111) * - AC (1) * EXP(-P1) DE (112) * ADE (111) * AC(1) DE (113) * - BDE (111) * AC(1) DE (114) * - BDE (113) * AC(1) DE (121) * EXP(P2) * (AC(2) * COS(P3) DE (122) * EXP(P2) * (AC(3) * COS(P3) DE (123) * EXP(P2) * (AC(3) * COS(P3) DE (124) * EXP(P2) * (AC(3) * COS(P3) DE (131) * EXP(P2) * (AC(3) * COS(P3) DE (132) * EXP(P2) * (AC(3) * COS(P3) DE (133) * EXP(P2) * (AC(1) * COS(P3) DE (134) * EXP(P2) * (AC(1) * COS(P3) DE (134) * EXP(P2) * (AC(1) * COS(P3) DE (134) * EXP(P2) * (AC(1) * COS(P3) DE (144) * EXP(P2) * (AC(1) * COS(P3) DE (144) * EXP(P2) * (AC(1) * COS(P3) DE (143) * EXP(P2) * (AC(1) * COS(P3) DE (144) * EXP(P2) * (AC(3) * COS(1) DE (143) * EXP(P2) * (AC(3) * COS(1) DE (143) * EXP(P2) * (AC(3) * COS(1) DE (153) * EXP(P2) * (AM(6) * COS(1) DE (154) * AC(2) * DE (163) DE (161) * AC(2) * DE (163) DE (161) * AC(2) * DE (163) DE (174) * AC(2) * DE (163) DE (174) * AC(2) * DE (173) DE (181) * - AC(1) * SIN(P1) DE (181) * - AC(1) * SIN(P1) DE (181) * - AC(1) * SIN(P1) DE (183) * - (AC(1) * SIN(P1) DE (193) * - (AC(1) * SIN(P2) | DE(104) BDE(103) AC(1) DE(111) = AC(1) EXP(-P1) DE(112) = ADE(111) AC(1) DE(113) = ODE(112) AC(1) DE(113) = ODE(113) AC(1) DE(113) = BDE(113) AC(1) DE(121) EXP(P2) (AC(2) COS(P3) DE(122) EXP(P2) (AC(3) COS(P3) DE(123) EXP(P2) (AC(3) COS(P3) DE(131) EXP(P2) (AC(3) COS(P3) DE(132) EXP(P2) (AC(3) COS(P3) DE(132) EXP(P2) (AC(3) COS(P3) DE(133) EXP(P2) (AC(3) COS(P3) DE(133) EXP(P2) (AC(3) COS(P3) DE(134) EXP(P2) (AC(3) COS(P3) DE(134) EXP(P2) (AC(3) COS(P3) DE(143) EXP(P2) (AC(3) COS(P3) DE(143) EXP(P2) (AC(3) COS(P3) DE(143) EXP(P2) (AC(3) COS(P3) DE(144) EXP(P2) (AC(3) COS(P3) DE(152) EXP(P2) (AC(3) COS(P3) DE(152) EXP(P2) (AC(3) COS(P3) DE(152) EXP(P2) (AC(3) COS(P3) DE(152) EXP(P2) (AC(3) COS(P3) DE(154) EXP(P2) (AC(3) COS(P3) DE(154) EXP(P2) (AC(3) COS(P3) DE(154) EXP(P2) (AC(1) COS(P1) DE(154) EXP(P2) (AC(1) EXP(P2) DE(171) = AC(2) EXP(P2) DE(173) EXC(2) EXP(P2) DE(161) = AC(1) EXP(P2) DE(173) EXC(2) EXP(P2) DE(174) EXC(1) EXP(P2) DE(174) EXC(2) EXP(P2) DE(174) EX | DE(1104) * BDE(103) * AC(1) DE(111) * AC(1) * AC(1) DE(112) * ADE(111) * AC(1) DE(113) * BDE(113) * AC(1) DE(113) * BDE(113) * AC(1) DE(121) * EXP(P2) * (AC(2) * COS(P3) - DE(122) * EXP(P2) * (AC(3) * COS(P3) - DE(123) * EXP(P2) * (AC(3) * COS(P3) - DE(124) * EXP(P2) * (AC(3) * COS(P3) + DE(132) * EXP(P2) * (AC(3) * COS(P3) + DE(132) * EXP(P2) * (AC(3) * COS(P3) + DE(132) * EXP(P2) * (AC(2) * COS(P3) + DE(132) * EXP(P2) * (AC(2) * COS(P3) + DE(132) * EXP(P2) * (AC(2) * COS(P3) + DE(134) * EXP(P2) * (AC(2) * COS(P3) + DE(134) * EXP(P2) * (AC(2) * COS(P3) + DE(144) * EXP(P2) * (AC(3) * COS(P3) + DE(143) * EXP(P2) * (AC(3) * COS(P3) + DE(144) * EXP(P2) * (AC(3) * COS(P3) + DE(144) * EXP(P2) * (AC(3) * COS(P3) + DE(151) * EXP(P2) * (AC(3) * COS(P3) + DE(152) * EXP(P2) * (AC(3) * COS(P3) + DE(152) * EXP(P2) * (AC(3) * COS(P3) + DE(153) * EXP(P2) * (AC(3) * COS(P3) + DE(153) * EXP(P2) * (AC(3) * COS(P3) + DE(153) * EXP(P2) * (AC(3) * COS(P3) + DE(154) * AC(2) * EXP(P2) * (AM(6) * COS(P3) + DE(153) * EXP(P2) * (AM(6) * COS(P3) + DE(163) * AC(2) * DE(161) + DE(163) * AC(2) * DE(163) + DE(163) * AC(2) * DE(163) + DE(163) * AC(2) * DE(163) + DE(173) * AC(2) * DE(163) + DE(173) * AC(2) * DE(163) + DE(174) * AC(2) * DE(173) + DE(174) * AC(2) * BDE(173) + DE(174) * AC(2) * BDE(173) + DE(184) * (AC(1) * 3) * COS(P1) + DE(184) * (AC(1) * 3) * COS(P1) + DE(193) * (AC(1) * 3) * COS(P1) + DE(193) * (AC(1) * 4) * COS(P1) + DE(193) * (AC(2) * COS(P1) + DE(194) * (AC(1) * 4) | DE(1104) - BDE(103) *AC(1) DE(111) - AC(1)*EXP(-P1) DE(112) - BDE(111)*AC(1) DE(113) - BDE(111)*AC(1) DE(113) - BDE(113)*AC(1) DE(114) - BDE(113)*AC(1) DE(121) - EXP(P2)*(AC(2)*COS(P3) - A(DE(123) - EXP(P2)*(AC(3)*COS(P3) - A(DE(124) - EXP(P2)*(AC(3)*COS(P3) - A(DE(132) - EXP(P2)*(AC(3)*COS(P3) - A(DE(132) - EXP(P2)*(AC(3)*COS(P3) - A(DE(132) - EXP(P2)*(AC(3)*COS(P3) - A(DE(133) - EXP(P2)*(AC(3)*COS(P3) - A(DE(134) - EXP(P2)*(AC(4)*COS(P3) - A(DE(134) - EXP(P2)*(AC(4)*COS(P3) - A(DE(134) - EXP(P2)*(AC(4)*COS(P3) - A(DE(144) - EXP(P2)*(AC(4)*COS(P3) - A(DE(144) - EXP(P2)*(AC(4)*COS(P3) - A(DE(144) - EXP(P2)*(AC(3)*COS(P3) - A(DE(144) - EXP(P2)*(AC(3)*COS(P3) - A(DE(144) - EXP(P2)*(AC(3)*COS(P3) - A(DE(151) - EXP(P2)*(A(A(4)*COS(P3) - A(DE(151) - AC(2)*EXP(P2) DE(162) - AC(2)*EXP(P2) DE(163) - AC(2)*DE(161) DE(163) - AC(2)*DE(161) DE(163) - AC(2)*DE(171) DE(173) - AC(1)*COS(P1) DE(174) - AC(1)*SIN(P1) DE(181) - AC(1)*SIN(P1) DE(184) - (AC(1)*3)*SIN(P1) DE(193) - (AC(1)*3)*SIN(P1) DE(194) - (AC(1)*3)*SIN(P2) | DE(1104) * BDE(103) * AC(1) DE(111) * AC(1) * AC(1) DE(112) * ADE(111) * AC(1) DE(113) * BDE(113) * AC(1) DE(114) * BDE(113) * AC(1) DE(121) * EXP(P2) * (AC(2) * COS(P3) - AC(1) DE(122) * EXP(P2) * (AC(1) * COS(P3) - AC(1) DE(122) * EXP(P2) * (AC(1) * COS(P3) - AC(1) DE(124) * EXP(P2) * (AC(3) * COS(P3) - AC(1) DE(124) * EXP(P2) * (AC(3) * COS(P3) - AC(1) DE(132) * EXP(P2) * (AC(3) * COS(P3) - AC(1) DE(133) * EXP(P2) * (AC(2) * COS(P3) + AC(1) DE(133) * EXP(P2) * (AC(2) * COS(P3) + AC(1) DE(133) * EXP(P2) * (AC(2) * COS(P3) + AC(1) DE(134) * EXP(P2) * (AC(2) * COS(P3) + AC(1) DE(144) * EXP(P2) * (AC(2) * COS(P3) + AC(1) DE(144) * EXP(P2) * (AC(3) * COS(P3) + AC(1) DE(144) * EXP(P2) * (AC(3) * COS(P3) + AC(1)) DE(151) * EXP(P2) * (AC(3) * COS(P3) + AC(1)) DE(152) * EXP(P2) * (AC(3) * COS(P3) + AC(1)) DE(152) * EXP(P2) * (AC(3) * COS(P3) + AC(1)) DE(153) * EXP(P2) * (AC(3) * COS(P3) + AC(1)) DE(154) * EXP(P2) * (AC(1) * COS(P1)) DE(163) * AC(2) * DE(171) DE(174) * AC(2) * DE(171) DE(174) * AC(2) * DE(173) DE(1174) * AC(2) * DE(173) DE(1181) * AC(1) * COS(P1) DE(181) * AC(1) * COS(P1) DE(193) * (AC(1) * COS(P1)) DE(194) * (AC(1) * COS(P | DE (104) * BDE (103) * AC(1) DE (111) * AC(1) * AC(1) DE (112) * ADE (112) * AC(1) DE (113) * BDE (112) * AC(1) DE (114) * BDE (113) * AC(1) DE (114) * BDE (113) * AC(1) DE (121) * E XP (P2) * (AC(2) * COS(P3) - AH(2) DE (122) * E XP (P2) * (AH(3) * COS(P3) - AH(2) DE (123) * E XP (P2) * (AH(3) * COS(P3) - AH(2) DE (132) * E XP (P2) * (AH(3) * COS(P3) - AH(2) DE (132) * E XP (P2) * (AH(4) * COS(P3) + AH(1) DE (133) * E XP (P2) * (AH(4) * COS(P3) + AH(1) DE (133) * E XP (P2) * (AH(4) * COS(P3) + AH(1) DE (133) * E XP (P2) * (AH(4) * COS(P3) + AH(1) DE (143) * E XP (P2) * (AH(4) * COS(P3) + AH(1) DE (143) * E XP (-P2) * (AH(4) * COS(P3) + AH(1) DE (143) * E XP (-P2) * (AH(4) * COS(P3) + AH(1) DE (144) * E XP (-P2) * (AH(4) * COS(P3) + AH(1) DE (144) * E XP (-P2) * (AH(5) * CUS(P3) + AN(1) DE (152) * E XP (-P2) * (AH(5) * CUS(P3) + AN(1) DE (153) * E XP (-P2) * (AH(5) * CUS(P3) + AN(1) DE (153) * E XP (-P2) * (AH(5) * CUS(P3) - AN(1) DE (153) * E XP (-P2) * (AH(4) * COS(P3) - AN(1) DE (153) * E XP (-P2) * (AH(4) * COS(P3) - AN(1) DE (153) * E XP (-P2) * (AH(6) * COS(P3) - AN(1) DE (153) * E XP (-P2) * (AH(6) * COS(P3) - AN(1) DE (154) * AC (2) * DE (162) DE (161) * AC (2) * DE (162) DE (161) * AC (2) * DE (162) DE (162) * AC (2) * DE (162) DE (161) * AC (2) * E XP (-P2) DE (162) * AC (2) * DE (162) DE (173) * - AC (2) * BDE (173) DE (113) * - AC (2) * BDE (173) DE (113) * - AC (1) * COS (P1) DE (113) * - AC (2) * SIN(P1) DE (123) * - (AC (1) * COS (P1) DE (123) * - (A | DE (104) * BDE (103) * AC(1) DE (112) * ADE (11) * AC(1) DE (112) * ADE (111) * AC(1) DE (113) * BDE (113) * AC(1) DE (114) * BDE (113) * AC(1) DE (114) * BDE (113) * AC(1) DE (121) * EXP(P2) * (AC(2) * COS(P3) - AC(3) DE (122) * EXP(P2) * (AC(3) * COS(P3) - AH(4) DE (123) * EXP(P2) * (AM(3) * COS(P3) - AH(4) DE (124) * EXP(P2) * (AM(2) * COS(P3) - AH(4) DE (132) * EXP(P2) * (AM(4) * COS(P3) + AH(1) DE (133) * EXP(P2) * (AM(4) * COS(P3) + AH(1) DE (133) * EXP(P2) * (AM(4) * COS(P3) + AH(1)) DE (134) * EXP(P2) * (AM(4) * COS(P3) + AH(1)) DE (142) * EXP(P2) * (AM(4) * COS(P3) + AH(1)) DE (142) * EXP(P2) * (AM(4) * COS(P3) + AH(1)) DE (143) * EXP(P2) * (AM(4) * COS(P3) + AH(1)) DE (143) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (143) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (152) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (152) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (153) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (153) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (153) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (153) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (153) * EXP(-P2) * (AM(4) * COS(P3) + AH(2)) DE (154) * AC(2) * BD (161) DE (154) * AC(2) * BD (161) DE (154) * AC(2) * BD (161) DE (151) * AC(2) * BD (161) DE (173) * AC(2) * BD (171) DE (174) * AC(2) * BD (173) DE (164) * AC(2) * BD (173) DE (164) * AC(1) * SIN(P1) DE (164) * AC(1) * SIN(P1) DE (164) * AC(1) * SIN(P1) DE (172) * AC(1) * COS(P1) DE (172) * AC(2) * SIN(P1) DE (172) * AC(2) * SIN(P2) | DE(1104) = BDE(105) = AC(1) DE(111) = -AC(1) = EXP(-P1) DE(112) = -BDE(111) = AC(1) DE(113) = -BDE(112) = AC(1) DE(114) = -BDE(113) = AC(1) DE(121) = EXP(P2) = (AC(2) = COS(P3) - AC(3)) DE(122) = EXP(P2) = (AM(1) = COS(P3) - AM(2)) DE(123) = EXP(P2) = (AM(3) = COS(P3) - AM(4)) DE(124) = EXP(P2) = (AM(3) = COS(P3) - AM(4)) DE(132) = EXP(P2) = (AM(2) = COS(P3) - AM(4)) DE(132) = EXP(P2) = (AM(2) = COS(P3) - AM(4)) DE(132) = EXP(P2) = (AM(4) = COS(P3) - AM(4)) DE(132) = EXP(P2) = (AM(4) = COS(P3) - AM(3)) DE(134) = EXP(P2) = (AM(4) = COS(P3) - AM(3)) DE(134) = EXP(P2) = (AM(4) = COS(P3) - AM(3)) DE(142) = EXP(-P2) = (AM(4) = COS(P3) - AM(3)) DE(144) = -EXP(-P2) = (AM(3) = COS(P3) - AM(4)) DE(151) = -EXP(-P2) = (AM(3) = COS(P3) - AM(4)) DE(152) = -EXP(-P2) = (AM(3) = COS(P3) - AM(4)) DE(151) = -EXP(-P2) = (AM(4) = COS(P3) - AM(4)) DE(152) = -EXP(-P2) = (AM(4) = COS(P3) - AM(4)) DE(152) = -EXP(-P2) = (AM(4) = COS(P3) - AM(4)) DE(152) = -EXP(-P2) = (AM(4) = COS(P3) - AM(4)) DE(153) = -EXP(-P2) = (AM(4) = COS(P3) - AM(4)) DE(154) = -EXP(-P2) = (AM(4) = COS(P3) - AM(5)) DE(164) = -AC(2) = DE(163) DE(164) = -AC(2) = DE(172) DE(174) = -AC(1) = SIN(P1) DE(174) = -AC(1) = SIN(P1) DE(174) = -AC(2) = SIN(P1) DE(174) = -AC(2) = SIN(P1) DE(174) = -AC(2) = SIN(P1) DE(174) = -AC(2) = SIN(P2) DE(174) = -AC(2) = | DE(1104)*BDE(103)*AC(1) DE(111)*-AC(1)*EXP(-P1) DE(112)*-BDE(111)*AC(1) DE(112)*-BDE(111)*AC(1) DE(114)*-BDE(111)*AC(1) DE(112)*EXP(P2)*(AC(2)*COS(P3)-AC(3)*S DE(122)*EXP(P2)*(A(1)*COS(P3)-AH(4)*S DE(123)*EXP(P2)*(A(1)*COS(P3)+AH(4)*S DE(131)*EXP(P2)*(A(1)*COS(P3)+AH(4)*S DE(131)*EXP(P2)*(A(1)*COS(P3)+AH(4)*S DE(131)*EXP(P2)*(A(1)*COS(P3)+AH(1)*S DE(131)*EXP(P2)*(A(4)*COS(P3)+AH(1)*S DE(131)*EXP(P2)*(A(4)*COS(P3)+AH(3)*S DE(131)*EXP(P2)*(A(4)*COS(P3)+AH(3)*S DE(131)*EXP(P2)*(AH(4)*COS(P3)+AH(3)*S DE(134)*EXP(P2)*(AH(4)*COS(P3)+AH(3)*S DE(141)*=EXP(-P2)*(AH(4)*COS(P3)+AH(3)*S DE(141)*=EXP(-P2)*(AH(4)*COS(P3)+AH(3)*S DE(144)**EXP(-P2)*(AH(5)*CUS(P3)+AH(3)*S DE(144)**EXP(-P2)*(AH(5)*CUS(P3)+AH(3)*S DE(144)**EXP(-P2)*(AH(5)*CUS(P3)+AH(3)*S DE(151)**EXP(-P2)*(AH(5)*CUS(P3)-AH(1)*S DE(152)*=EXP(-P2)*(AH(4)*CUS(P3)-AH(3)*S DE(153)**EXP(-P2)*(AH(6)*CUS(P3)-AH(3)*S DE(153)**EXP(-P2)*(AH(6)*CUS(P3)-AH(3)*S DE(161)*AC(2)**DE(161)*S DE(161)*AC(2)**DE(161)*S DE(161)*AC(2)**DE(163)*S DE(161)*-AC(2)**DE(171)*S DE(161)*-AC(2)**DE(171)*S DE(161)*-AC(1)**S*N(P1)*S DE(161)*-AC(1)**S*N(P1)*S DE(161)*-AC(1)**S*N(P1)*S DE(161)*-AC(1)**S*N(P1)*S DE(162)*-(AC(1)**S*N(P1)*S*N(P1)*S DE(192)*-(AC(1)**S*N(P1)*S*N(P1)*S DE(192)*-(AC(1)**S*N(P1)*S*N(P1)*S*N(P1)*S DE(192)*-(AC(1)**S*N(P1)*S* | DDE(111) =- AC(1) * EXP(-P1) DDE(112) =- ADE(111) * AC(1) DDE(112) =- ADE(111) * AC(1) DDE(112) =- ADE(111) * AC(1) DDE(112) == EXP(P2) * (AC(2) * COS(P3) - AC(3) * SI DDE(122) == EXP(P2) * (AC(3) * COS(P3) - AN(2) * SI DDE(122) == EXP(P2) * (AC(3) * COS(P3) - AN(4) * SI DDE(124) = EXP(P2) * (AC(3) * COS(P3) - AN(6) * SI DDE(132) = EXP(P2) * (AC(3) * COS(P3) - AN(6) * SI DDE(132) = EXP(P2) * (AC(3) * COS(P3) - AN(6) * SI DDE(132) = EXP(P2) * (AC(3) * COS(P3) - AN(6) * SI DDE(132) = EXP(P2) * (AC(3) * COS(P3) - AN(1) * SI DDE(133) = EXP(P2) * (AM(6) * COS(P3) + AM(1) * SI DDE(134) = EXP(P2) * (AM(6) * COS(P3) + AM(2) * SI DDE(141) =- EXP(P2) * (AM(6) * COS(P3) + AM(2) * SI DDE(142) =* EXP(P2) * (AM(5) * COS(P3) + AM(2) * SI DDE(142) =* EXP(-P2) * (AM(5) * COS(P3) - AM(2) * SI DDE(142) =* EXP(-P2) * (AM(5) * COS(P3) - AM(2) * SI DDE(144) =* EXP(-P2) * (AM(5) * COS(P3) - AM(2) * SI DDE(152) == EXP(-P2) * (AM(5) * COS(P3) - AM(3) * SI DDE(152) == EXP(-P2) * (AM(5) * COS(P3) - AM(3) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(3) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(3) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(3) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(3) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(5) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(5) * SI DDE(152) == EXP(-P2) * (AM(6) * COS(P3) - AM(5) * SI DDE(152) == AC(2) * DDE(162) DE(162) = AC(2) * DDE(171) DE(163) = AC(2) * DDE(173) DE(161) == AC(1) * SI N(P1) DE(162) == (AC(1) * SI N(P1) DE(162) == (AC(1) * SI N(P1) DE(163) == (AC(1) * SI N(P1) DE(163) == (AC(1) * SI N(P1) DE(162) == (AC(1) * SI N(P2) DE(1201) == AC(2) * SI N(P2) | DE(111) AC(1)*EXP(-P1) DE(112) ADE(111)*AC(1) DE(112) ADE(111)*AC(1) DE(112) ADE(111)*AC(1) DE(112) ADE(111)*AC(1) DE(121) -EXP(P2)*(AC(2)*COS(P3)-AC(3)*SIN DE(122) -EXP(P2)*(A'(1)*COS(P3)-AN(4)*SIN DE(123) -EXP(P2)*(A'(3)*COS(P3)-AN(4)*SIN DE(123) -EXP(P2)*(A'(4)*COS(P3)-AN(4)*SIN DE(132) -EXP(P2)*(A'(4)*COS(P3)+A(1)*SIN DE(132) -EXP(P2)*(A'(4)*COS(P3)+A(1)*SIN DE(132) -EXP(P2)*(A'(4)*COS(P3)+A(1)*SIN DE(131) -EXP(P2)*(A'(4)*COS(P3)+A(1)*SIN DE(131) -EXP(P2)*(A'(4)*COS(P3)+A(1)*SIN DE(131) -EXP(P2)*(A'(4)*COS(P3)+A(1)*SIN DE(141) EXP(-P2)*(A'(4)*COS(P3)+A(1)*SIN DE(142) -* EXP(-P2)*(A'(4)*COS(P3)+A'(4)*SIN DE(143) EXP(-P2)*(A'(4)*COS(P3)+A'(4)*SIN DE(143) EXP(-P2)*(A'(4)*COS(P3)+A'(4)*SIN DE(143) EXP(-P2)*(A'(4)*COS(P3)+A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(4)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(5)*SIN DE(152) EXP(-P2)*(A'(4)*COS(P3)-A'(5)*SIN DE(151) EXP(-P2)*(A'(4)*COS(P3)-A'(5)*SIN DE(151) EXP(-P2)*(A'(4)*COS(P3)-A'(5)*SIN DE(151) AC(12)*EXP(-P2) DE(162) AC(12)*EXP(-P2) DE(161) AC(12)*EXP(-P2) DE(161) AC(1)*SIN(P1) DE(1172) AC(1)*SIN(P2) | DE (111) AC (1) * AC (1) DE (112) ADE (110) * AC (1) DE (112) ADE (111) * AC (1) DE (112) ADE (111) * AC (1) DE (112) ADE (113) * AC (1) DE (112) -E XP (P2) * (AC (2) * COS (P3) AC (3) * S [N(DE (122) -E XP (P2) * (AM (1) * COS (P3) AM (-) * S [N(DDE (123) -E XP (P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (124) * E XP (P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (132) -E XP (P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (132) -E XP (P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (133) -E XP (P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (133) -E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (141) E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (141) E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (142) -* E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (143) E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (143) E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (151) -* E XP (-P2) * (AM (-) * COS (P3) +- AM (-) * S [N(DDE (151) -* E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (152) -* E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P3) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P1) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P1) AM (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P1) AC (-) * S [N(DDE (153) ** E XP (-P2) * (AM (-) * COS (P1) AC (-) * S [N(DDE (153) ** E XP (-P2) * S [N(P1] AC (-) * S [N(P1) AC (-) * S | DE(111) - AC(1)*(XP(-P1)) DE(112) - ADE(111)*(C(1)) DE(112) - ADE(111)*(C(1)) DE(112) - BDE(112)*(C(1)) DE(112) - EXP(P2)*(AC(2)*COS(P3) - AC(3)*S[N(P DE(122) - EXP(P2)*(AC(3)*COS(P3) - AN(2)*S[N(P DDE(122) - EXP(P2)*(AC(3)*COS(P3) - AN(4)*S[N(P DDE(122) - EXP(P2)*(AC(3)*COS(P3) - AN(4)*S[N(P DDE(122) - EXP(P2)*(AC(3)*COS(P3) - AN(6)*S[N(P DDE(132) - EXP(P2)*(AC(3)*COS(P3) - AN(6)*S[N(P DDE(132) - EXP(P2)*(AC(3)*COS(P3) - AN(6)*S[N(P DDE(132) - EXP(P2)*(AN(4)*COS(P3) - AN(5)*S[N(P DDE(132) - EXP(P2)*(AN(6)*COS(P3) - AN(5)*S[N(P DDE(132) - EXP(P2)*(AN(6)*COS(P3) - AN(5)*S[N(P DDE(132) - EXP(P2)*(AN(6)*COS(P3) - AN(5)*S[N(P DDE(142) - EXP(-P2)*(AN(1)*COS(P3) - AN(5)*S[N(P DDE(142) - EXP(-P2)*(AN(5)*COS(P3) - AN(5)*S[N(P DDE(142) - EXP(-P2)*(AN(5)*COS(P3) - AN(5)*S[N(P DDE(152) - EXP(-P2)*(AN(5)*COS(P3) - AN(5)*S[N(P DDE(152) - EXP(-P2)*(AN(5)*COS(P3) - AN(5)*S[N DDE(152) - EXP(-P2)*(AN(5)*COS(P3) - AN(5)*S[N DDE(152) - EXP(-P2)*(AN(6)*COS(P3) - AN(5)*S[N DDE(152) - AC(2)*DDE(161) DDE(153) + EXP(-P2)*(AN(6)*COS(P3) - AN(5)*S[N DDE(153) + EXP(-P2)*(AN(6)*COS(P3) - AN(5)*S[N DDE(153) + EXP(-P2)*(AN(6)*COS(P3) - AN(5)*S[N DDE(153) + EXP(-P2)*(AN(6)*COS(P1) - AN(5)*S[N DDE(153) + AC(2)*DDE(163) DE(1171) - AC(2)*TNPE(163) DE(1171) - AC(2)*TNPE(163) DE(1171) - AC(2)*TNPE(173) DE(1102) - AC(1)*S[N(P1) DE(1102) - AC(1)*COS(P1) DE(1102) - AC(1)*COS(P1) DE(1103) - AC(2)*S[N(P2)] DE(1201) - AC(2)*S[N(P2)] | DE(111) AC(1) * AC(1) DE(112) AC(1) * AC(1) DE(112) ADE(111) * AC(1) DE(112) ADE(112) * AC(1) DE(112) ADE(112) * AC(1) DE(112) ADE(113) * ADE(1) DE(112) ADE(113) * ADE(1) * ADE(13) * ADE(13) * SIN(P3) DE(112) ADE(12) * (AM(3) * COS(P3) - AM(3) * SIN(P3) DE(113) EXP(P2) * (AM(3) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(P2) * (AM(4) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(4) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(4) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(1) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(1) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(1) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(1) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(1) * COS(P3) + AM(1) * SIN(P3) DE(113) EXP(-P2) * (AM(1) * COS(P3) + AM(1) * SIN(P3) DE(115) EXP(-P2) * (AM(2) * COS(P3) - AM(1) * SIN(P3) DE(115) EXP(-P2) * (AM(2) * COS(P3) - AM(1) * SIN(P3) DE(115) EXP(-P2) * (AM(2) * COS(P3) - AM(1) * SIN(P3) DE(115) EXP(-P2) * (AM(4) * COS(P3) - AM(5) * SIN(P3) DE(115) EXP(-P2) * (AM(4) * COS(P3) - AM(5) * SIN(P3) DE(115) EXP(-P2) * (AM(4) * COS(P3) - AM(5) * SIN(P3) DE(115) AD(1) * COS(P1) DE(115) AD(1) * COS(P1) DE(115) AD(1) * COS(P1) DE(116) AD(1) * | DE(104) - BDE(103) + AC(1) DE(112) AC(1) + EXP(-P1) DE(113) BDE(111) + AC(1) DE(113) BDE(111) + AC(1) DE(113) BDE(111) + AC(1) DE(112) - EXP(P2) + (AC(2) + COS(P3) - AC(3) + SIN(P3) DE(122) - EXP(P2) + (AC(3) + COS(P3) - AN(2) + SIN(P3) DE(122) - EXP(P2) + (AC(3) + COS(P3) - AN(4) + SIN(P3) DE(131) - EXP(P2) + (AC(3) + COS(P3) - AN(4) + SIN(P3) DE(131) - EXP(P2) + (AC(3) + COS(P3) - AN(4) + SIN(P3) DE(131) - EXP(P2) + (AC(3) + COS(P3) - AN(4) + SIN(P3) DE(131) - EXP(P2) + (AC(2) + COS(P3) + AC(3) + SIN(P3) DE(133) - EXP(P2) + (AM(4) + COS(P3) + AN(3) + SIN(P3) DE(133) - EXP(P2) + (AM(4) + COS(P3) + AN(3) + SIN(P3) DE(144) - EXP(-P2) + (AM(4) + COS(P3) + AN(3) + SIN(P3) DE(144) - EXP(-P2) + (AM(5) + COS(P3) - AC(2) + SIN(P3) DE(144) - EXP(-P2) + (AM(5) + COS(P3) - AC(2) + SIN(P3) DE(151) - EXP(-P2) + (AM(2) + COS(P3) - AN(3) + SIN(P3) DE(151) - EXP(-P2) + (AM(4) + COS(P3) - AN(3) + SIN(P3) DE(151) - EXP(-P2) + (AM(4) + COS(P3) - AN(3) + SIN(P3) DE(151) - EXP(-P2) + (AM(4) + COS(P3) - AN(3) + SIN(P3) DE(151) - AC(2) + BD(10) DE(152) - CXP(-P2) + (AM(4) + COS(P3) - AN(3) + SIN(P3) DE(151) - AC(2) + BD(17) DE(152) - CXP(-P2) + (AM(4) + COS(P3) - AN(5) + SIN(P3) DE(151) - AC(2) + BD(17) DE(152) - CXP(-P2) + (AM(4) + COS(P3) - AN(5) + SIN(P3) DE(151) - AC(2) + BD(17) DE(151) - AC(2) + BD(17) DE(151) - AC(2) + BD(17) DE(151) - AC(2) + BD(17) DE(117) - AC(1) + BD(172) DE(117) - AC(1) + BD(172) DE(117) - AC(1) + BD(172) DE(117) - AC(1) + BD(172) DE(117) - AC(1) + COS(P1) DE(117) - AC(1) + COS(P1) DE(119) - (AC(1) + COS(P1) DE(119) | DE(104)+BDE(103)*AC(1) DE(112)AC(1)*EXP(-P1) DE(112)ADE(111)*AC(1) DE(113)BDE(111)*AC(1) DE(114)BDE(113)*AC(1) DE(112)-EXP(P2)*(AC(2)*COS(P3)-AC(3)*S[N(P3)) DE(122)-EXP(P2)*(AC(3)*COS(P3)-AN(4)*S[N(P3)) DE(122)-EXP(P2)*(AC(3)*COS(P3)-AN(4)*S[N(P3)) DE(132)-EXP(P2)*(AC(3)*COS(P3)-AN(4)*S[N(P3)) DE(132)-EXP(P2)*(AC(2)*COS(P3)+AC(1)*S[N(P3)) DE(132)-EXP(P2)*(AC(2)*COS(P3)+AN(4)*S[N(P3)) DE(132)-EXP(P2)*(AC(2)*COS(P3)+AN(3)*S[N(P3)) DE(132)-EXP(P2)*(AC(2)*COS(P3)+AN(3)*S[N(P3)) DE(141)-EXP(P2)*(AC(2)*COS(P3)+AN(3)*S[N(P3)) DE(141)-EXP(P2)*(AC(2)*COS(P3)+AN(3)*S[N(P3)) DE(144)-EXP(-P2)*(AC(3)*COS(P3)+AN(3)*S[N(P3)] DE(144)-EXP(-P2)*(AC(3)*COS(P3)+AN(4)*S[N(P3)] DE(144)-EXP(-P2)*(AC(3)*COS(P3)-AN(2)*S[N(P3)] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3)] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3)] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(3)*S[N(P3]] DE(151)-EXP(-P2)*(AC(3)*COS(P3)-AN(5)*S[N(P3]] DE(151)-AC(2)*FXP(-P2) DE(151)-AC(2)*FXP(-P2) DE(151)-AC(2)*FXP(-P2) DE(171)-AC(2)*FXP(-P2) DE(171)-AC(2)*FXP(-P2) DE(174)-AC(2)*FXP(-P2) DE(174)-AC(2)*FXP(-P2) DE(174)-AC(2)*FXP(-P2) DE(174)-AC(2)*FXP(-P2) DE(174)-AC(2)*FXP(-P2) DE(174)-AC(2)*FXP(-P2) DE(174)-AC(1)**S(N(P1) DE(194)-(AC(1)**3)*S[N(P1)] DE(193)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**3)*S[N(P1)] DE(194)-(AC(1)**4)*S[N(P2)] DE(194)-(AC(1)**4)*S[N(P2)] | DE(104) * BDE(103) *AC(1) DE(112) * ADE(110*X*(1) DE(112) * ADE(112) *AC(1) DE(113) * ADE(112) *AC(1) DE(113) * ADE(112) *AC(1) DE(121) *EXP(P2) * (AC(2) *COS(P3) * AC(3) *S[N(P3)) DE(122) *EXP(P2) * (A*(1) *COS(P3) * A*(2) *S[N(P3)) DE(123) *EXP(P2) * (A*(3) *COS(P3) * A*(4) *S[N(P3)) DE(131) *EXP(P2) * (A*(5) *COS(P3) * A*(4) *S[N(P3)) DE(132) *EXP(P2) * (A*(5) *COS(P3) * A*(4) *S[N(P3)) DE(131) *EXP(P2) * (A*(4) *COS(P3) * A*(4) *S[N(P3)) DE(132) *EXP(P2) * (A*(4) *COS(P3) * A*(4) *S[N(P3)]) DE(133) *EXP(P2) * (A*(4) *COS(P3) * A*(4) *S[N(P3)]) DE(133) *EXP(P2) * (A*(4) *COS(P3) * A*(4) *S[N(P3)]) DE(133) *EXP(P2) * (A*(4) *COS(P3) * A*(4) *S[N(P3)]) DE(141) **EXP(P2) * (A*(4) *COS(P3) * A*(4) *S[N(P3)]) DE(141) **EXP(P2) * (A*(1) *COS(P3) * A*(4) *S[N(P3)]) DE(141) **EXP(-P2) * (A*(1) *COS(P3) * A*(4) *S[N(P3)]) DE(143) **EXP(-P2) * (A*(1) *COS(P3) * A*(4) *S[N(P3)]) DE(151) **EXP(-P2) * (A*(5) *COS(P3) * A*(4) *S[N(P3)]) DE(152) **EXP(-P2) * (A*(5) *COS(P3) * A*(6) *S[N(P3)]) DE(152) **EXP(-P2) * (A*(5) *COS(P3) * A*(6) *S[N(P3)]) DE(151) **EXP(-P2) * (A*(5) *COS(P3) * A*(6) *S[N(P3)]) DE(152) **EXP(-P2) * (A*(6) *COS(P3) * A*(6) *S[N(P3)]) DE(152) **EXP(-P2) * (A*(6) *COS(P3) * A*(6) *S[N(P3)]) DE(153) **EXP(-P2) * (A*(6) * COS(P3) * A*(6) *S[N(P3)]) DE(154) **EXP(-P2) * (A*(6) * COS(P3) * A*(5) *S[N(P3)]) DE(154) **EXP(-P2) * (A*(6) * COS(P1)) DE(161) **C(2) **EXP(P2) DE(161) **C(2) **EXP(P2) DE(161) **C(1) **COS(P1) DE(161) **C(1) **COS(P1) DE(191) **C(1) **COS(P1) DE(194) **(AC(1) **3) *COS(P1) DE(194) **(AC(1) **3) *COS(P1) DE(194) **(AC(1) **3) *COS(P1) DE(194) **(AC(1) **A) *S[N(P1)] DE(194) **(AC(1) **A) *S[N(P1)] DE(194) **(AC(1) **A) *S[N(P1)] DE(194) **(AC(1) **A) *S[N(P1)] DE(194) **(AC(2) *S[N(P2)] |

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. 74 75 76 77 SDE(211)=AC(2)+COS(P2) BDE(212)=-(AC(2)++2)+S[N(P2) BDE(213)=- (AC(2)++3)+COS(P2) 78 BDE(214)=(AC(2)++4)+SIN(P2) 79 80 81 82 BDE(221) -- AC.(3) + SIN(P3) BDE(222)=-(AC(3)++2)+COS(P3) BDE(223)=(AC(3)++3)+S[V(P3) 83 84 85 BDE(224)=(AC(3)++4)+COS(P3) \$6 87 .. BDE(731)=AC(3)+COS(P3) 89 BDE(232) =- (AC(3) ++2) +514(P3) BDE(233) =- (AC(3) ++3) +COS(P3) 90 91 BDE(234)=(AC(3)++4)+SIN(P3) 92 93 94 95 SDE(241)=AC(3)+EXP(P3) BDE(242)=AC(3)+RDE(241) BDE(243)=AC(3)+9DE(242) 96 97 BDE12441=AC(3)+8UE(243) 98 99 BOE(251)=-AC(3)+EXP(-P3) 100 BDE(252) =- AC(3) + BDE(251) 101 SDE(253) -- AC(3) + BUE(252) 102 BDE(254) =- AC(3) + BDE(253) 103 104 RETURN 105 106-END1 SUBROUTINE POLYR (N. COEFF. ROOTS, D) DIMENSION A(51,3), (A(51,3), ROJTS(2,N), D(1), COEFF(1) 2 INTEGER DEGREE 3 DEGREE ... 4 N1=UEGREE+1 5 H=10 6 HHAX=15 7 DEL TA=0.0001 . EPSILON=0.000001 9 00 1 1-1.N1 10 ALL, 1)+CGEFF(1) 11 12 [A[[.1]=0 CALL SCALE (A(I,1), [A(I,1)) 14 15 16 17 1 CONTINUE CALL RSSR (A, IA, ROOTS, DEGREE, M, MMAX, DELTA, EPSILON, D) IF (N1-(DEGREE+1)) 3,3,2 2 RETURN 3 PRINT 4 189 RETURN 19 20 4 FORMAT (2)HOSOME ROOTS NOT FOUND) 21 END 22-SUBROUTINE RSSR (A, 1A, ROOTS, DEGREE, M, MMAX, DELTA, FPSILON, D) DIMENSION A(51,3), IA(51,3), ROCTS(2,50), D(51), ROMOD(50), MROMOD 1 ... 2 1(50), NONRT(50), MNONRT(50) 3 INTEGER DEGREE 4 N-DEGREE 5

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| | SF (N) 1.1.3 | | |
|-----|---|------|-----|
| 1 | DEGREE-NCUR | | 7 |
| Ž | RETURN | | |
| 3 | N1 = N+ 2 | | 9 |
| | N2=N1+1 | | 10 |
| | DO 5 1-1-N | | 11 |
| | K=N2- [| | 12 |
| | 2F (A(K,1)) 6,4,6 | | 13 |
| 4 | ± = H 1 − 1. | | 14 |
| | R00T5(1,J)=0.0 | | 15 |
| | R00T5(2,J)=0.0 | | 16 |
| 5 | CONTINUE | | 17 |
| | DEGREE = 0 | | 18 |
| | 60 TO 2 | | 19 |
| | NEOK | | 20 |
| | N=K-1 | | 21 |
| | NCUR=N * | | 22 |
| | No 4 | | 23 |
| 7 | CALL ROOTSO (A, TA, NCUR, M) | | 24 |
| | CALL REALRT (A, IA, M, NCUR, DELTA, EPSILON, ROMOD, MROMOD, NONRT, MNONRT, N | l - | 25 |
| - 3 | 1CO.ROOTS) | | 26 |
| | EF (NCO) 12,12,8 | | 27 |
| | NE=NCUR+1 | | 28 |
| | CALL COMPRT (A, IA, ROMOD, ROOTS, M, MNONRT, NONRT, MROMOD, NCO, DELTA, EPSI | | 29 |
| | LLON, NCUR) | | 30 |
| | 1F (NCUR) 12,12,9 | | 31 |
| | EF (NL-NCUR) 11,11,10 | | 32 |
| 10 | NL =NC UR | | 33 |
| | 60 TO 7 | | 34 |
| 11 | K=N+1 | | 35 |
| | EF (MMAX-M) L.7.7 | | 36 |
| 12 | CALL RECON (ROOTS,A(1,1), TA(1,1), D, DEGREE) | | 37 |
| | CO TO 1 | | 38 |
| | END | | 39- |
| | SUBROUTINE ROOTSQ (A, IA, NCUR, MM) | | 1 |
| | DINENSION A(51,3), [A(51,3) | RTSQ | 2 |
| | NEA = NC UR + L | RTSQ | 3 |
| | DO 1 J=1,N1 | RTSQ | |
| | A(J,2) = A(J,1) | ATSO | 5 |
| | EA(J, 2)=IA(J, 1) | RTSQ | 6 |
| | A(J,3)=0.0 | RTSQ | 7 |
| | EA(J, 3) = 0 | RTSQ | 6 |
| 1 | CONTINUE | RTSQ | 9 |
| | DG 10 H-1, MM | RTSQ | 10 |
| | DO 7 J-1 ,N1 | RTSQ | 11 |
| | K1=N1=J | RTSQ | 12 |
| | K2=J-1 | RTSQ | 13 |
| | KR=XMINOFIK1,K21 | RTSO | 14 |
| | 8F (KM) 2,5,2 | RTSQ | 15 |
| 2 | D0 5 L=1,KM | RTSQ | 10 |
| | LR-IMODF(L,2) | RTSQ | 17 |
| | JL+J-L | RTSQ | 18 |
| | JLP=J+L | RTSQ | 14 |
| | BF (LR) 3,3,4 | RTSO | 20 |
| 3 | X= A{. ¹ , ,2}+A{JLP,2} | RTSO | 21 |
| | $\mathbf{E} \mathbf{X} = \{\mathbf{A} \{ \mathbf{J} \mathbf{L}_{\mathbf{i}} 2 \} + \{\mathbf{A} \{ \mathbf{J} \mathbf{L}_{\mathbf{i}} \mathbf{P}_{\mathbf{i}} 2 \}$ | RTSO | 22 |
| | CALL SCALE (X, IX) | RTSQ | 23 |
| | CALL ADD (A(J,3), [A(J,3), X, [X, A(J,3), [A(J,3)) | RTSO | 24 |
| | GO TO 5 | RTSO | 22 |
| • | x=A{JL,2}+A{JLP,2} | RTSQ | 26 |

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| * | | 8750 37 |
|-----|---|-----------|
| | IX-IA(JL,2)+IA(JLP,2) | KISY ZI |
| | CALL SCALF (X. IX) | RTSQ 28 |
| | PALL COTOT (ALL 3) TALE 31, 9, 19, ALL 31, TALE 311 | RTS0 29 |
| | CALL SDIKT TRIJISITIATS STATE AT A CONSTITUTION OF STATE | BTCO 30 |
| - 5 | CONTINUE | K124 20 |
| | A(J.3)=2.00A(J.3) | RTSQ 31 |
| | | RTSO 32 |
| | CALL SCALE (A(J))/(A(J))/ | ATCO 33 |
| | X=A(J,2)++2 · | KIDA DD |
| | 1x=1A(J,2)+1A(J,2) | RTSQ 34 |
| | PALL CRAIE (V. IV) | RTSO 35 |
| | CALL JURLE INVIAN | BTS0 36 |
| | CALL ADD TATJISTIATJISTIATIATATSTITATSTI | |
| | JR=XMODF(J,2) | K154 31 |
| | 1F (JR) 6.6.7 | RTSQ 38 |
| | | RTSO 39 |
| - 1 | | ATSO AO |
| - 7 | CONTINUE | ATCO 41 |
| | IF (MM-M) 10,10,8 | K120 41 |
| | 1 | RTSQ 42 |
| - | A(A, 2) = A(1, 2) | RTSO 43 |
| | | 8750 44 |
| | 8A(J,2)=1A(J,3) | N130 44 |
| | A(J,3)=0.0 | KI20 45 |
| | RA(J-3)=0 | RTSQ 46 |
| | CONTINUE | RTSO 47 |
| | | RTSO AR |
| 10 | CONTINUE | N130 40 |
| | RETURN | R126 44 |
| | END | RTSQ 50- |
| | SURROUTINE REALET (A.TA.K.NCUR. DELTA. EPSILON. ROMOD. MROMOD. NONRT. | MN |
| | LOND T NC (BOUTS) | |
| | | |
| | DIMENSION A(51,5), (A(51,5), ROOTS(2,50), ROHOU(50), AROHOU(50), | NKLKI S |
| | 10NRT(50), MNONRT(50), RAT[0(51), IPIV(51), ARED(50), IARED(50) | RLRT 4 |
| | RATIO(1)=L.U | RLRT 5 |
| | | RLRT 6 |
| | | |
| | | REAT 7 |
| | IF (A(1,3)) 2,1,2 | RLRT 6 |
| 1 | RAT[0(1)=0.0 | RLRT 9 |
| - | 60 TO A | RLRT 10 |
| | | BIRT 11 |
| | 1=8(1,2)=8(1,2) | NENI LL |
| | | REKT 15 |
| | CALL SCALE (T,IT) | RLRT 13 |
| | T=T/A(1,3) | RLRT 14 |
| | ITALT-LA(1,3) | BIRT 15 |
| | | B1 B7 14 |
| - | | RENT LO |
| 3 | IF (IT+Z) 1,4,4 | RLRT 17 |
| | CALL UNSCALE (T,IT) | RLRT 18 |
| | RATIO(1)=T | RLRT 19 |
| | | PLPT 20 |
| | | ALAT 20 |
| > | RATIO(L)=~RATIO(L) | RERT 21 |
| | CONTINUE | RLRT 22 |
| | RAT[0(NCUR+1)=1.0 | RLRT 23 |
| | | BIRT 24 |
| | | BLAT 36 |
| | | RLKI 23 |
| | DO 9 I=2,NCUR | RLRT 26 |
| | X=ABSF(RAT[J(1)-1.0) | * RLRT 27 |
| | LE (X-DELTA) 7.8.8 | RLRT 28 |
| | | |
| Ŧ | | ALAI 24 |
| • | 60 TO 9 | RERT 30 |
| | [P[V([)=0 | RLRT 31 |
| | CONTINUE | RLRT 42 |
| | | 8127 13 |
| | | ALAI 33 |
| | | REKT 34 |
| | | |
| | MULT=0 | RLRT 35 |

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14=1
10 11-11+1
    12=11+1
   NULT=PULT+1
    IF (1P1V(12)) 10.10,11
11 ROMOD(14)=A(12,3)/A(1,3)
IROMOD=IA(12,3)-IA(1,3)
   CALL SCALE (ROMOD(14). IROMOD)
IF (ROMOD(14)) 12,13,13
12 ROMOD(14) =- ROMOD(14)
13 CALL DOUBLOG (ROMOD(14), IROMOD, XN, IXN)
    T=2++H+11
    XN=XN/T
CALL SCALE (XN.IXN)
CALL DLEXP (XN.IXN,ROMOD(14),IROMOD)
IF (IROMOD-74) 14,14,15
14 IF (IROMOD+74) 15,15,16
15 ROMOD(141=0.0
    IROMOD=J
   60 TU 17
16 CALL UNSCALE (ROMODI 14), IROMOD)
17 MROMODII4)=HULT
   IF (NCUR+1-12) 19,19,18
18 1=12
    14=14+1
    MULT=0
    11=0
    GO TO 10
19 0=0.0
   NCO=J
    DO 28 1=1.14
    KL=14+1-1
    M=-ROMODIKL)
    15=HROHODIKL)
   DO 26 J=1.15
    J=J
20 CALL TEST (A, LA, W, Q, NCUR, ROMOD(KL), EPSILON, K)
    IF (K) 23+23+21
21 ROOTS(1, NCUR) --- W
    ROOTS(2+NCUR)=0.0
    ARED(1)=4(1,1)
    [ARED(1)=[A(1,1)
   00 22 L=2.NCUR
    Y=ARED(L-1)+H
    IY=IARED(L-1)
   CALL SCALE (Y, IY)
CALL SBTRT (A(L, 1), TA(L, 1), Y, IY, ARED(L), TARED(L))
    A(L.1)=ARED(L)
    IAIL, 11+1ARED(L)
22 CONTINUE
GO TO 25
23 IF (W) 24,27,27
24 H=-W
   GO TO 20
25 NEUR=NEUR-1
26 CONTINUE
   60 TO 28
27 NCO= NCO+1
   NONRTINCO]=KL
   MNONRT(NCO)=15+1-J
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RLRT 37 RLRT 38

RLAT 39

RLRT 40

RLRT 41

RLRT 42 RLRT 43

RLRT 44 RLRT 45 RLAT 46

RLRT 47 RLRT 48

RLRT 49

RLRT 54 RLRT 55

RLRT 57

RLRT 60

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RLRT 64 RLRT 65

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RLRT 80

RLRT #1

RLRT 82 RLAT 83 RLAT 84

RLRT 85

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RLRT 87 RLAT 88 RLRT 89

RLRT 90 RLRT 91

RLRT 92

RLRT 93

RLRT 94

RLRT 95

RLRT 96

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RLRT

RLRT

50 RIRT 51 ALAT 52 RLRT 53

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58 RLRT 59

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76 RLRT 71

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RLAT

RLRT 97 28 CONTENUE RLAT 98 RETURN **RLRT 99-**END SUBROUTINE COMPRT (A, IA, ROMOD, ROOTS, M, MNONRT, NONRT, HROMOC, NCO, DEL T++++ 1 1A.EPSILON, NCURI 2 **DIMENSION A(51,3), IA(51,3), ROMOD(50), KOOTS(2,50), SR(51,3), ISR 1(51,3), SRCMUD(50), SROOTS(2,50), MNONRT(50), NONRT(50), MSROMOD(5 20), NSONRT(47), MSNORT(49), MRCMOD(50), U(2), R(2), B(49)** 3 4 5 00 28 1=1.NCO 4 JA-NONRT([] 7 11-MNONRT(1) 8 11=11/2 9 IF (11) 1:1.2 10 1 [1=1 2 [F (ROMOD(JA)) 3,28,3 11 1 12 13 3 Q=ROMOD(JA) 14 00 27 J=1.11 CALL SUBRES (A, IA, NCUR, SR, ISR, Q) IF (NCUR-4) 5,4,6 15 16 4 NSCUR=2 17 GO TO 7 5 NSCUR=1 18 19 20 J2=1 GO TO B SCUR=NCUR-3 21 22 23 7 J2=NSCUR . LL=NSCUR+1 24 IF (NSCUR-1) 9,9,11 9 IF (SR(1,1)) 10,12,10 25 26 10 X=SR(1.1) 27 IX=1SR(1,1) 28 Y=SR(2,1) 29 1Y=15R(2.1) 30 CALL UNSCALE (X. 1X) 31 CALL UNSCALE (Y, IY) 32 SROOTS(1,1)=-Y/X 33 NSCUR=0 34 GO TO 13 35 11 CALL ROOTSO (SR. ISR. NSCUR.M) CALL REALRT (SR. ISR.M.NSCUR, DELTA, EPSILON, SROMOD, MSROMOD, NSONRT, MS 36 37 INORT.NSCO.SPOUTS) 38 IF (J2-NSCUR) 12,12,13 39 12 SROJTS(1, J2)+J.J 13 SROJTS(1, J2)+SROJTS(1, J2)+ROHOD(JA) 40 41 T=ROMOD(JA)+RUMOD(JA) 42 IF (SROOTS(1, J2)-T) 14,21,21 43 14 #=SROOTS(1, J2) 44 WE-ROMODIJAI+ROMODIJA) 45 CALL TEST (A, 14, W, WE, NCUR, ROMOD(JA), EPSILON, K) IF (K) 20, 20, 15 46 47 15 ROOTS(1, NCUR) -- W/2.0 48 49 1-4.0+WE 50 51 52 U=V+W T=T-U IF (T) 16,16,17 16 T=-T 53 54 55 U=SORT(T) ROOTS(1, NCUR)=ROOTS(1, NCUR)-U/2.0 ROOTS(1.NCUR-1)=- (W-U)/2.0 56 ROOTS(2, NCUR)=0.0 57

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ROOTS[2.NCUR-1]=0.0
                                                                                         58
                                                                                          59
GO TO 18
17 U-SQRT(T)
                                                                                         60
61
62
63
64
65
66
67
   ROOTS(2, NCUR)=U/2.0
   ROOTS(1,NCUR-1)=ROOTS(1,NCUR)
   ROOTS(2, NCUR-1) =- ROOTS(2, NCUR)
18 D(1)=W
   D(2)=WE
   CALL QUADIV (NCUR, A. IA, R. D. B)
    JX=NCUR-1
   DO 19 JY=1, JX
A(JY, 1)=B(JY)
                                                                                         68
                                                                                         69
70
    IA(JY,1)=0
                                                                                         71
   CALL SCALE (A(JY,1), [A(JY,1))
19 CONTINUE
                                                                                         72
                                                                                         73
   NCUR=NCUR-2
   GO TO 27
                                                                                         74
20 M=-W
                                                                                         75
                                                                                         76
   CALL TEST (A, IA, W, WE, NCUR, ROMOD(JA), EPSILON, K)
IF (K) 21,21,15
21 IF (J2-(NSCUR+1)) 28,22,24
                                                                                         78
22 IF (J2-1) 26,28,23
                                                                                         79
23 J2=J2-1
                                                                                         80
   SROOTS(1, J21=0.0
                                                                                         81
GO TO 14
24 IF (SROJTS(1, J2)-SROOTS(1, J2-1)) 25,26,25
                                                                                         82
                                                                                         83
                                                                                         84
25 J2=J2-1
   60 TO 13
                                                                                         85
26 J2=J2-1
                                                                                         86
   GO TO 21
                                                                                         87
27 CONTINUE
                                                                                         ..
28 CONTINUE
                                                                                         89
                                                                                         10
   RETURN
                                                                                         91-
    END
                                                                                   .... 1
    SUBROUTINE TEST (A.IA.W.Q.N.ROMUD.EPSILON.K)
                                                                                   TEST
   DIMENSION A(51,3), TA(51,3), B(3), (B(3), T(2), E(2), C(51)
                                                                                   TEST
    8(1)=0.0
    1X=0
                                                                                   TEST
    IN=0
                                                                                   TEST
    18(1)=0
                                                                                   TEST
   B(2)=A(1,1)

1B(2)=[A(1,1)

D0 2 1=1.N
                                                                                   TEST
                                                                                   TEST
    X=N+B(2)
                                                                                   TEST 10
    IX=18(2)
                                                                                   TEST L1
   CALL SCALE (X, IX)
Y=Q+B(1)
                                                                                   TEST 12
                                                                                   TEST 13
    IV-IN(1)
                                                                                   TEST 14
   CALL SCALE (Y.TY)
                                                                                   TEST 15
   CALL ADD (X,1X,Y,1Y,2,12)
CALL SBTRT (A(1+1,1),1A(1+1,1),2,12,8(3),18(3))
                                                                                   TEST 16
                                                                                   TEST 17
   1F (N-1) 2,2,1
                                                                                   TEST 1d
 1 8(1)=8(2)
                                                                                   TEST 19
   18(1)=[8(2)
                                                                                   TEST 20
TEST 21
                                                                                 ÷
   8(2)=8(3)
   18(2)=18(3)
                                                                                   TEST 22
 2 CONTINUE
                                                                                   TEST 23
   KOUNT=1
                                                                                   TEST 24
   CEPSIL-EPSILON
                                                                                   TEST 25
   T(1)=0.05T(2)=0.0
                                                                                   TEST 26
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TEST 27 TEST 28 TEST 29 TEST 30 TEST 31 N1=N+1 X=2.C+EPSILON Y=X+ROMOD ELLI-ROMOD+Y E(2)-ROMOD+CEPSIL +ROMOD TEST 32 TEST 32 TEST 33 TEST 34 TEST 36 00 6 1-1.41 1F (A(1,1)) 3,4,4 3 C(1)=-A(1,1)51C=[A(1,1) 60 TO 5 4 C(1)-A(1,1)SIC-TA(1,1) S CALL UNSCALE (C(I),IC) T(1)+T(1)+E(1)+C(I) T(2)+T(2)+E(2)+C(I) S CONTINUE TEST 37 TEST 38 TEST 34 TEST 40 6 CONTINUE DIF=T(1)=T(2) IF (0) 10,7,1d 7 IF (8(3)) 8,9,9 8 B(3)==B(3) 9 IF (18(3)=74) 10,10,12 10 IF (18(3)=74) 12,11,11 11 CALL UNSCALE (8(3),18(3)) IF (0IF=B(3)) 12,12,17 12 K=0 TEST 40 TEST 41 TEST 42 TEST 43 TEST 44 TEST 45 TEST 46 TEST 47 TEST 48 TEST 49 TEST 50 TEST 51 12 K=0 IF (KOUNT-2) 13,14,16 I3 IF (Q) 15,14,15 I4 IF (W) 15,16,16 I5 SENSE LIGHT 2 KOUNT-KOUNT+1 TEST 52 TEST 53 TEST 54 KOUNT=KOUNT+1 16 RETURN 17 K=1 GO TO 16 18 IF (18(2)=74) 10,10,12 19 IF (18(2)=74) 12,20,20 20 CALL UNSCALE (8(2)=18(2)) IF (18(3)=74) 21,21+12 21 IF (18(3)=74) 12,22,22 22 CALL UNSCALE (8(3)=18(3)) X=0+8121+8(2) 21 J+8(2) TEST 55 56 TEST TEST 57 TEST 58 TEST 59 TEST 60 TEST 61 TEST 62 TEST 63 X=Q+B(2)+B(2) Y=W+B(2)+B(3) Z=B(3)+B(3) Y=X=Y+Z TEST 64 TEST 65 TEST 66 TEST 67 1F (Y) 23,17,24 23 Y--Y TEST 68 TEST 69 24 DIF-DIF-DIF TEST 70 TEST 71 TEST 72-1F (DIF-Y) 12,17,17 END SUBROUTINE SUBRES (A. LA. N. SR. ISR. ROMOD) DIMENSION A(51,3), [A(51,3), SR(51,3), ESR(51,3), C(51), A(50,3) N1=N+1 T=1.0 D0 L I=L.N J=N1-1 T-T+ROMOD C(J)+A(J,1)+T IC-IA(J,1) CALL UNSCALE (CTJ),IC) & CONTINUE G(N1)=A(N1.1) IC+IA(N1,1) CALL UNSCALE (C(N1),IC)

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IF (N-2) 17,17,2 2 N2=N-2 DO 3 I=1,N2 B(I,1)=0.0 B(1.2)=0.0 3 CONTINUE 1=2 B(1,2)=C(1) 4 8(1,3)=C(1)-8(1,1) 00 5 J=2.N2 B(J,3) = -B(J-1,2) - B(J,1)S CONTINUE IF (N-(3+1)) 8,6.6 4 I=I+1 DO 7 J=1,N2 B(J,1)=8(J,2) B(J,2)=H(J,3) 7 CONTINUE GO 10 4 8 IF (N-4) 19,9,13 9 IF (N-(2+1)) 12,10,10 10 1=1+1 DO 11 J=1,2 8(J,1)=B(J,2) B(J,2)=8(J,3) 11 CONTINUE GO TO 4 12 8(3,3)=-8(2,2) SR(3,1)=-C(5)+B(1,3) ISR(3,1)=0 SR(2,1)=B(2,3) [SR(2,1)=0 SR(1,1)=8(3,3) ISR(1,1)=0 CALL SCALE (SR(1,1),1SR(1,1)) CALL SCALE (SR(2,1),1SR(2,1)) CALL SCALE (SR(2,1),1SR(2,1)) CALL SCALE (SR(3,1),1SR(3,1)) GO TO 16 13 SR(V2+1)=C(V)-8(1+3) ESR(12,1)=0 SR(N2-1,1)=-C(N1)-B(2,3) ISR(N2-1,1)=0 CALL SCALE (SR(N2,1),ISR(N2,1)) .CALL SCALE (Sk(N2-1,1),ISR(N2-1,1)) EF 442-21 16,16,14 14 DO 15 J=3,N2 K=12+1-J SR(4.1)=-8(J.3) ESR(K,1)=0 CALL SCALE (SR(K,1), ISR(K,1)) 15 CONTINUE 16 RETURN 17 SR(1.1)=C(1) ISR(1,1)=0 SR(2,1)=-C(2) ISR(2,1)=0 18 CALL SCALE (SR(1,1), ISR(1,1)) CALL SCALE (SR(2,1), ISR(2,1)) 60 TU 16 19 SR(1,1)=-C(4)

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SR(2,1)+C(3)-C(1) 158(1,1)=0 158(2,1)=0 60 TO 18 END SUBROUTINE RECON (ROOTS, A, LA, D, N) DIMENSION ROOTS(2, 50), D(51) X=A IX-IA CALL UNSCALE (X, 1X) DO 1 [+1.N D([]+0.0 1 CONTENUE D(N+1)=1.0 1=1 NL=N-1 2 IF (ROOTS(2,1)) 3,7,3 3 T=ROOTS(1,1)=ROOTS(1,1) U=ROOTS(2,1)=ROOTS(2,1) T=T+U U=2.0+ROOTS(1.1) 00 5 J=1.NL IF (1+J-1) 5.4.4 4 0(J)=0(J+2)+T+0(J) (J+L)0+U-(L)0+(L)0 \$ CONTINUE D(N)=T+U(N) D(N)=D(N)-U+D(N+1) 0(N+1)=T+D(N+1) 0(N+1)=1+D(N+1) 1=1+2 6 1F (N-1) 10,2,2 7 D0 9 J=1,N 1F (J+1-N) 9,9,8 8 D(J)=D(J+1)=D(J) *R00TS(1,1) 9 CONTINUE D(N+1)=-D(N+1)*R00TS(1,1) 1=1+2 1-1+1 GO TO 6 10 NS=N+1 DO 11 []=1,NS D(]])=D(]])+K T1 CONTINUE RETURN END SURROUTINE QUADEV (N.A.14.R.D.8) DIMENSION A(51.3), 1A(51.3), R(2), U(2), 8(49) 8(1)=A(1.1) 10-14(1,1) CALL UNSCALE (B(1),18) 17 (N-2) 4,4,1 3 AA=A(2,1) 1AA=IA(2,1) IAA=IA(2,1) CALL UNSCALE (AA,IAA) B(2) 4AA=R(1)+D(1) IF (N=3) 4,4,2 2 NT=N=1 DO 3 1=3,:T XN=R(1-1)+D(1) TN=B(1-2)+U(2) AA+IA AA+A([,L)

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And Address of the

IAA=IA(I,1) CALL UNSCALE (AA,IAA) B(I)=AA-(XN+YN) 3 CONTINUE 4 XN=B(N-1)+D(1) YN=B(N-2)+D(2) AA=A(N.1) IAA-IA(N,1) CALL UNSCALE (AA,IAA) R(1)+AA-(XN+YN) AA=A(N+1,1) IAA=[A('4+1,1) CALL UMSCALE (AA,1AA) R(2)=AA=B(N=1)+D(2) RETURN END SUBROUTINE DOUBLOG IX. IX. Y. IVI T+64.0 IF (X) L,2,3 1 PRINT 5 2 4=0.0 17+0 GO TO 4 3 TO-1X V=ALOGIXI+TU+ALOGITI 14=0 CALL SCALE (V, IV) 4 RETURN S FORMAT (46HOTHE LOG OF A NON-POSITIVE NUMBER IS REQUESTED) END SUBROUTINE DLEXP (X. IX. Z. IZ) Z=EXPIXI 12=0 1F (1x) 1,0,6 1 1==1x 11-6-1 11-001 D0 4 J=1,11 K=XMODF(12,2) 1F (K) 2,3,2 2 L2=12-1 2=64.0+2 3 12=12/2 2-SORT(2) CALL SCALE (2,12) 4 CONTINUE 5 RETURN 6 1-6+1X 00 7 J=1.1 2+2+2 12=12+12 GALL SCALE (2,12) 7 CONTINUE GO TO 5 6 CALL SCALE (2,12) GO TO 5 END SUBROUTINE ADD (X.IX.V.EV.2.12) 1F (X) 3,1,3 1 2-Y

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12-14 2 RETURN 3 IF (Y) 3,4.5 4 2=X 12=1× 60 TO 2 5 101FF=1X-1Y IF (101FF) 6,7,7 6 14-14 A=Y B=X IDIFF=-101FF 60 TO 8 7 1A=1X A=X 8=Y 8 IF (16-10(FF) 9,9,10 9 Z=A 12=1A GO TO 2 10 IF (IDIFF) 11,13,11 11 DO 12 I=1,IDIFF 8=8/64.0 12 CONTINUE 13 CONTINUE 2+4+8 12=1A CALL SCALE (2,12) GO 10 2 END SUBROUTINE SETRY (X. IX. Y. IY. Z. 12) W=-Y CALL ADD (X.IX.W. TY. 2.12) RETURN ENO SUBROUTINE SCALE (X. IX) REC64=1.0/64.0 IF (X) 1,11,2 1 Y=-X 60 TO 3 2 Y=X 3 IF (64.0-Y) 4.5.5 4 4=4/64.0 IX=IX+1 GO TO 3 5 IF (Y-REC64) 6.7.7 6 Y=Y+64.0 IX=IX-1 GO 10 5 7 LF (X) 8,9,9 8 X=-Y GO TO 10 9 X=V 10 RETURN 11 1X=0 GO TO 10 END SUBROUTINE UNSCALE (X. IX) IF (1X+R4) 1.2.2 1 X=0.0

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10 11 12

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19 20 21

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IX-0
60 TO 8
2 IF (1X-94) 4.4.3
3 X=1.0E+153
  EX=0
  PRINT 7
60 TO 6
4 IF (IX) 5,6,5
5 X=X+64. J+=1X
  fx=a
A RETURN
T FORMAT (25HOEXP. OVERFLOW IN UNSCALE)
  END
  SUBROUTINE CHECKI (V.AC. PP1. PP2. PP3)
  DIMENSION VIAL. AC(3)
  VII)+VII)+EXP(PPI)
  ¥(2)=¥(2)+EXP(-PP1)
  AV3=EXP(PP2)+(V(3)+COS(PP3)+V(4)+STH(PP3))
  AV4=EXP(PP2)=(V(4)+CUS(PP3)-V(3)+SIN(PP3))
  AV5=EXP(-PP2)+(V(5)+COS(PP3)+V(6)+S[N(PP3)]
  AV6=EXP(-PP2) + (V(6)+COS(PP3)-V(3)+S(N(PP3))
  V(3)=AV3
  V(4)=AV4
  ¥(5)=4¥5
  V(6)=AV6
  RETURN
  END
  SUBROUTINE CHECK2 (V.AC. PP1. PP2. PP3)
 DIRENSION V161. AC(3)
AV1+V(1)+CGS(PP1)+V(2)+S[N(PP1)
  AY2=-VILI+SIN(PP1)+VI2)+COS(PP1)
  ¥11) - AV1
  ¥(2)=AV2
  AV3=EXP(PP2)+(V(3)+COS(PP3)+V(4)+S1N(PP3))
  AV4=EXP(PP2)+(V(4)+COS(PP3)-V(3)+S[N(PP3)]
  AV5=EXP(-PP2)+(V(5)+COS(PP3)+V(6)+S[N(PP3)]
 AV6=EXP(-PP2) + (V(6)+COS(PP3)-V(5)+S(N(PP3))
 V(3)=AV3
 V(4)=AV4
 V(5)-AVS
 V(6) - AV6
 RETURN
 END
 SUBROUTINE CHECKA IV.AC. PP1. PP2. PP31
 DINENSION VIGI, ACIII
 V(1)=V(L)+EAP(PPL)
 ¥(2)=¥(2)+EXP(-PPL)
 AV3=V(3)+COS(PP2)+V(4)+SIN(PP2)
 AV4=-V(3)+SIN(PP2)+V(4)+COS(PP2)
 AV5=V151+COS(PP3)+V161+SIN(PP3)
 AV6=-V(5)+SIN(PP3)+V(6)+COS(PP3)
 V(3)-AV3
 ¥141=4¥4
 VISI-AVS
 V(6)=AV6
 RETURN
 END
 SUBROUTINE CHECKS IV.AC, PP1, PP2, PP3)
```

4 5 67 . 9P 10 11 12 13 14 15 16 17-.... 1 CHECK 2 CHECK 3 CHECK 4 CHECK 5 CHECK 6 CHECK 7 CHECK 6 CHECK 9 CHECK10 CHECKIL CHECK12 CHECK13 CHECK14 CHECK15-.... 1 Z 3 4 5 6 7 8 9 10 11 12 13 14 15 16-.... 1 CHK4 2 CHK4 3 CHK4 4 CHK4 5 CHK4 6 CHK4 7 CHK4 đ CHK4 9 CHK4 10 CHK4 11 CHK4 12 CHK4 13 CHK4 14-.....

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| DIMENSION V(4), AC(3) | CHK5 2 |
|---|------------------|
| V(1)-V(1)+EXP(PP1) | CHK5 3 |
| ¥{2}=¥{2}=EXP{-PP1} | CHK5 4 |
| ¥(3)+¥(3)+EXP(PP2) | CHK5 5 |
| V(4)-V(4)-EEP(-PP2) . | CHK5 6 |
| AV5.01530C05(PP3).01630510(PP3) | CHK5 7 |
| AVAVISIOSINIPESIOVIA10(05/201) | CHK5 B |
| | CHE5 9 |
| | CH45 10 |
| | CH45 11 |
| REIVEN | 6HK3 11 |
| END | CHR.3 12- |
| SUBROUTI'E NICF (ROOT, AC, KLIP) | |
| DIMENSION ICOLOI, IIM(6), INE(6) | RICF 2 |
| DIMENSION ROUT(2.6), AC(3) | RICF 3 |
| COMMON /KLP/ 1C1,1C2,1C3,1C4,1C5,1C6,1M1,1M2,1M3,1M4,1M5,1 | 16, IRL, IRICF 4 |
| 1R2,1R3,1%4,1R5,1R6 | RICF 5 |
| EQUIVALENCE (ICL.ICO(1)), (IML.IIM(1)), (IRL.IRE(1)) | RICF 6E |
| WRITE (9.20) | RICF 74 |
| WRITE (9.21) ((ROOT(1.J).1=1.2).J=1.6) | RICF BW |
| 4 J=L 4 | RICF 9 |
| 10111-0 | RICF 10 |
| 11N(J)+0 | RICF 11 |
| IRF(J)=0 | RICF 12 |
| | BICE 13 |
| | RICE 14 |
| | RICE 15 |
| | RICE IN |
| | |
| | |
| $\mathbf{F} \mathbf{(ABS(ROOT(1,J)))} (ABS(ROOT(1$ | AICE 10 |
| IF (ARS(ROOT(2,J)).L1.L.E-12) RJ3((2,J)=0.3 | |
| IF (RCOT(2, J). EQ. 0. 5) G5 T0 4 | |
| IF (ROOT(1,J)) 2,3,2 | RILF 21 |
| 2 10-10-1 | |
| 100(10)-J | RICE 23 |
| 60 TO 5 | RILF 24 |
| 3 1.411+1 | RICF 25 |
| L={1]]MEF | RICF 26 |
| 60 16 5 | RICF 27 |
| A 18==================================== | RICF 28 |
| IRE(IR)=J | RICF 29 |
| 5 CONTINUE | RICF 30 |
| WRITE (9,22) IR, 11, 1C | RICF 31W |
| 1F (1R.EC. 2. AND. 1C.EQ. 4) GO TO 6 | RICF 32 |
| IF (IR.EQ. 2. ANU. IM.EU. 4) GO TO 7 | RICF 33 |
| IF (IH.EO.6) GO TO 9 | RICF 34 |
| IF (IF.EQ. 2. AND. IC.EQ. 4) GO TO 16 | RICF 35 |
| SF (IR.EG. 4. AND. TH.EU. 2) GO TO L7 | RICF 36 |
| IF (1R.EU.6) CO TO 19 | R1CF 37 |
| 60 10 19 | RICF 38 |
| | RICF 39 |
| | RILF 40 |
| 6 KL 1P+1 | RICE 41 |
| | RICF 42 |
| AC(11=ABS(ROJT(1.1711) | RICE 43 |
| AC (2) + ARS (R())T(1.1(1)) | RILF 44 |
| AC (1) + ARS (R.)) ()) ()) | RICE 45 |
| | RILF 46 |
| 9 #1 10.2 | RICF 47 |
| C REFTS | RICE AN |
| | RICE AU |
| ALI11-ABS(RUUILL, [R[]) | RIGE 44 |

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AC(2)=ABS(ROOT(2,IML))
                                                                            RICF 50
                                                                            RICF 51
    IF (AC(2). NE. ABS(ROJT(2, 1M2))) GO TO B
    AC(3)=ABS(RGOT(2,[M3])
                                                                            RICF 52
                                                                            RICF 53
    RETURN
                                                                            RICF 54
  AC(3)=ABS(RUOT(2,[M2])
                                                                            RICF 55
    RETURN
                                                                            RICF 56
  9 KLIP=3
                                                                            RICF 57
                                                                            RICE 58
                                                                            RICF 59
    AC(1)=ABS(ROOT(2,1M1))
    IF (ABSIROOT(2, [M1]).NE. ABS(ROOT(2, [M2])) GO TO 10
                                                                            RICF 60
    AC(2)=ABS(ROOT(2,1M3))
                                                                            RICF 61
    IF (ABS(ROOT(2,1M4)).NE.AC(1).AND.ABS(ROOT(2,1M4)).NE.AC(2)) GO TORICE 62
                                                                            RICF 63
   1812
    60 10 14
                                                                            RICF 64
10 AC(2)=ABS(ROOT(2, [M2))
                                                                            RICF 65
    IF (ABS(ROOT(2,IM3)).EQ. AC(1)) GO TO 11
IF (ABS(ROOT(2,IM3)).FQ. AC(2)) GO TO 13
                                                                            RICF 66
                                                                            RICF 67
    AC(3)=ABS(RGOT(2,[M3])
                                                                            RICF 68
    RETURN
                                                                            RICF 69
11 IF (ABS(ROOT(2, [M4]).EO. AC(2)) GO TO 14
                                                                            RICF 70
12 AC(3)=ABS(RUOT(2,1H4))
                                                                            RICF 71
    RETURN
                                                                            RICF 72
13 IF (APS(RODT(2,1M4)).NE.AC(1)) GO TO 15
                                                                            RICF 73
14 AC(3)=ABS(ROOT(2+145))
                                                                            RICE 74
   RETURN
                                                                            RICE 75
15 AC(3)=A65(ROUT(2,1M4))
                                                                            RICF 76
   RETURN
                                                                            RICF 71
                                                                            RICF 78
                                                                            RICF 79
16 KLIP=4
                                                                            RICF 80
   AC(1)=A85(R00T(2,1M1))
                                                                            RICF 81
   AC(2)=ABS(RUUT(1,1C1))
                                                                            RICF 82
   AC(3)=ABS(RCOT(2,IC1))
                                                                            RICF 83
                                                                            RICF 84
   RETURN
                                                                            RICF 85
17 KLIP=5
                                                                            RICF 86
                                                                            RICF 87
   AC(1)=ABS(ROGT(1.TR1))
                                                                            RICF 88
   AC(3)=ABS(RUDT(2+FM2))
                                                                            RICF 89
   IF (ABS(ROOT(1, 1R2)), EQ. AC(1)) GO TO 18
                                                                            RICF 90
   AC(2)=ABS(ROUT(1, IR2))
                                                                            RICE 91
   RETURN
                                                                            RICF 92
18 AC(2)=ABS(RGOT(1, 1R3))
                                                                            RICF 95
19 KLIP=1776
                                                                            RICE 94
   RETURN
                                                                            RICE 95
                                                                            RICF 96
20 FORMAT (10X,10H ROOTS )
21 FORMAT (1X,E12.5,12X,E12.5)
                                                                            RICF 97
                                                                            RICF 98
22 FORMAT (10X, 3HIR=14, 3X, 3HII=14, 3X, 3HIC=14/)
                                                                            R1CF 99
   END
                                                                            RICFIOG-
   SUBROUTINE FINGLE (EN, V)
                                                                            .... 1
                                                                                  2
   DEMENSION FEN(3.31. VP(3)
                                                                                  3
   DIMENSION DEN(3.3), EN(6.7), V(6), DUDU(6), C(3.1)
                                                                                  4
   00 1 1=1.3
                                                                                  5
   DO 1 J=1.3
                                                                                  6
   DENIT, JI=0.0
                                                                                  7
 I CONTINUE
                                                                                  8
   00 2 1-1.3
                                                                                  9
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10 DEN(1,1)=EN(1+3,1) 11 DEN(1,2)=EN(1+3,3) DEN(1,3)=EN(1+3,4) 12 C(1,1)=EN(1+3,7) 13 2 CONTINUE 14 WRITE (9,9) ((DEN(1, J), J=1,3), I=1,3) 154 CALL LEQ (DEN, C, 3, 1, 3, 3, DET) 16 V(1)+C(1,1) 17 ¥(3)=C(2.1) 18 V(4)=C(3,1) 19 204 WRITE (9,10) V(1),V(3),V(4) 00 3 1-1,3 21 22 00 3 J=1.3 FEN(1, J)=0.0 23 & CONTINUE 24 25 00 4 1-1.3 26 FEN(1.1)=EN(1.2) 27 FEN(1,2)=EN(1,5) FEN(1,3)=EN(1,6) 28 4 CONTINUE 29 C(1,1)=EN(1,7)-EN(1,1)+V(1)-EN(1,3)+V(3)-EN(1,4)+V(4) 30 C(2,1)+EN(2,7)-EN(2,1)+V(1)-EN(2,3)+V(3)-EN(2,4)+V(4) 31 C(3,1)=EN(3,7)-EV(3,1)+V(1)-EN(3,3)+V(3)-EN(3,4)+V(4) 32 WRITE (9.8) ((FEN(1,J),J=1.3),1=1.3) 33H WRITE (9.6) C(1.1),C(2.1),C(3.1) 344 35 CALL LEQ (FEN, C, 3, 1, 3, 3, DET) ¥(2)=C(1.1) 36 37 ¥(5)=C(2,1) V(6)=C(3,1) 38 WRITE (9,11) V(2),V(5),V(6) 394 DO 5 1=1,6 40 DUDU([])=EN(I,1)+V(1)+EN(I,2)+V(2)+EN(I,3)+V(3)+EN(I,4)+V(4)+EN(I,5) 41 11+V(5)+EN(1+6)+V(6)-EN(1,7) 42 43 S CONTINUE WRITE (4,7) (DUDU(1),1=1,6) 444 45 RETURN 46 & FORMAT LIX.25H FOR THE FEN MATRIX 47 /10x, 7HC(1,1)=E12.5,5X, 7HC(12,11=E12.5,5X.7HC(3,1)=E12.5/) 48 7 FORMAT (1X, 36H SOLUTION CHECK BY SUBSTITUTION IS /(6E12.5)) B FORMAT (1X, 20H FEN(1, J) BY ROWS IS/(3E15.7)) 49 50 • FORMAT (1x,2CH DEN(1,J) BY ROAS [5/(3615.7)) 10 FORMAT (1x,5HV(1)=612.5,2x,5HV(3)=612.5,2x,5HV(4)=612.5) 51 52 11 FORMAT (1x,5HV(2)=E12.5,2x,5HV(5)=E12.5,2x,5HV(6)=E12.5) 53 END 54-SUBROUTINE LEQ (A, B, NEQS, NSOLNS, IA, ID, DET) 1 LINEAR EQUATIONS SOLUTIONS FORTRAN II VERSION Solve a system of linear equations of the form ax=B by a modified 2 3 GAUSS ELIMINATION SCHEME 4 5 NEQS = NUMBER OF EQUATIONS AND UNKNOWNS 6 NSOLYS . NUMBER OF VECTOR SOLUTIONS DESIRED 7 IA . NUMBER OF ROAS OF A AS DEFINED BY DIMENSION STATEMENT ENTRY . IB = NUMBER OF ROWS OF B AS DEFINED BY DIMENSION STATEMENT ENTRY ADET = DETERMINANT OF A: AFTER EXIT FROM LEQ 9 10 11 12 DIMENSION A(IA, IA), B(18, 18) NSIZ="EQS 13 NBSIZ=NSULNS 14 NORMALIZE EACH ROW BY ITS LARGEST ELEMENT. FORM PARTIAL DETERNT 15

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DET=1.0
   00 6 1=1,NSTZ
   81G-A(1.1)
   IF (NSIZ-1) 17.17.1
 1 00 3 J=2,NS12
   IF (ARSF(BIG)-ABSF(A(1,J))) 2,3,3
 2 81G=411, J1
 3 CONTINUE
   $6=1.0/8IG
   00 4 J-1,NSIZ
 4 A([, J)=A([, J)=8G
   DO 5 J=1.NRSIZ
 5 8(1, J)=8(1, J)=8G
                                                                   -
   DET=DET+AIG
 6 CONTINUE
   START SYSTEM REDUCTION
   NUMSYS=NSIZ-1
   DO 16 I=1.NUMSYS
   SCAN FIRST COLUMN OF CURRENT SYSTEM FOR LARGEST ELEMENT
   CALL THE ROW CONTAINING THIS ELEMENT, ROW NBGRW
   NN=1+1
   81G=4(1,1)
   NAGRW=1
   DO 8 J=N'N.NSIZ
   IF (ABSF(BIG)-ABSF(A(J,L))) 7,8,8
 7 BIG=ALJ.II
   NBGRW=J
 & CONTINUE
   8G=1.0/81G
   SWAP ROW I WITH ROW NBGRW UNLESS I=NBGRW
   IF (NBGR -1) 4,12,7
   SWAP A-MATRIX ROWS
 9 DO 10 J=1,NS12
   TEMP=AINBGRH.J)
   AINBGRW, JI=AIL, JT
10 A(1, J)=TEMP
   DET=-DET
   SWAP B-MATRIX ROWS
   DO 11 J=1,NBS12
   TEPP=BI'IDGRW, J)
   SINBGRW, JI=B([.J]
11 BIL, J)=TEMP
   ELIMINATE UNKNOWNS FROM FIRST COLUMN OF CURRENT SYSTEM
12 DO 15 K= NN. .......
  COMPUTE PIVUTAL MULTIPLIER
   PHULT=-A(K+1)+8G
   APPLY PHULT TU ALL COLUMNS OF THE CURRENT A-MATRIX ROW
   515 N.H. 13 J=".N. NS12
13 A(K, J) + PHULT+ A(L, J) + A(K, J)
   APPLY PHULT TO ALL COLUMNS OF MATRIX B
   00 14 L+1, NOSIZ
14 B(K.L)+PHULT+B(T.L)+B(K.L)
15 CONTINUE
16 CONTINUE
  DO BACK SUBSTITUTION
   WITH R-MATRIX COLUMN = NCOLB
17 DO 22 NEGLE=1.NESIZ
  DO FOR ROW - NROW
  DO 21 1=1,NSI2
NROW=NSI2+1-1
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76 17 NUMBER OF PREVIOUSLY COMPUTED UNKNOWNS = NXS 78 NXS-NSIZ-NROW ARE WE DOING THE BOTTOM ROW 80 1F (4X5) 18.20.18 81 82 93 18 DO 19 K-1,NXS 84 19 TEMP+TENP+A (KK, NCOLA) +A(NROW, KK) 20 B(NROW, NCOLB) = (B(NROW, NCOLB) - TEMP) / A(NROW, NROW) 86 HAVE WE FINISHED ALL ROWS FOR B-MATRIX COLUMN . NCOLB 87 88 21 CONTINUE HAVE WE JUST FINISHED WITH B-MATRIX COLUMN NCOLB-NS12 90 91 22 CONTINUE 92 NOW FINISH COMPUTING THE DETERMINANT 93 94 00 23 1=1,HSI2 23 DET-DET-A(1,1) 95 WE ARE ALL DONE NOW WHEN ... 96 97 98-RETURN 1 END PRINT 2 COMMON DLTEMP COMMON DLTEMP COMMON TEMP, CA.EAC.NUA, NUAC.EB.EBC.NUB.NUBC.HA.HB.R.G3A.G3B.CA.CP.PRENT 3 1DA.OB.H.CACB.CAPCB.NUNU.GAMA.GAMB.K(40).AI551.G(7).RT(30).FNT0A.FMPRINT 4 1DA.OB.H.CACB.CAPCB.NUNU.GAMA.GAMB.K(40).AI551.G(7).RT(30).FNT0A.FMPRINT 5 2TOB.BDE16001.L04D1.AM(50).L04D2.EN(6.71.FNXA.FNXB.FMXA.FMXB.FNX.FMPRINT 5 PRINT 2 SX.FILDA.FNOB.AC(3).KLIP.ELL.UELPH(20).V(6).AL(18).WW.UWW.DU.W.WB.UNPHINT 6 48, DOWB, UDDWB, WA, DWA, MU, DHU, COMU, DDDWU, TAU, DTAU, WPJ, WWA, DWWA, MUA, DHP4INT / PRINT 9
 BUA

 CORMON /SHEAR/ OA.Q8.FQ

 REAL NUA.'JUAC.NUR.'HISC.NUNU.K.LOAD1.LOAD2

 WRITE (9.4) X.MA.HB.ELL.R.TEMP

 WRITE (9.5) WW.WWA

 WRITE (9.5) WW.WWA

 WRITE (9.6) WW.WA

 WRITE (9.1) WW.WA
 SUA PRINTLO PRINTILH PRINTI24 PRINTLIN PRINT14W PRIMISA PRENTIGH WRITE (9.7) WU,WUA WRITE (9.4) TAU.WPJ WRITE (9.9) FNXA.FNXB.FNXA.FMXB PRINTITY PRINTLEW PRINT19W WRITE (9.10) FNK, FME PRI4T20 WRITE 19,31 FHOA, FNOB PRENTZIN PRINT22 WRETE 19.13 QA.QR.FQ PRINT23 RETURN PRIMI24 1 FORMAT (1X,3HGA=E12.5,2X,3HGB=E12.5,2X,5HGBAR=E12.5/) 2 FORMAT (1X,29H 3 FORMAT (1X,5HFNOA=E12.5,2X,5HFN3B=E12.5) PRINTZO PRINTZO PRINTET 4 FORMAT (21,241= F9.2, 3HHA= F9.2.21, 3HH8= F4.2.21,4HELL= F7.1.21,24.2HR= F7PRI 4124 1.1.21. SHTEMP-ES. 1/1 PRINTSO 5 FORMAT (21.5HWIB)=E12.5.21.5HWIA)=E12.5/1 6 FORMAT (2X, BHRETA(R) = E12.5, 2X, BHBETA(A) = E12.5/) 7 FORMAT (2X, SHU(B) = E12.5, 2X, SHU(A) = E12.5/) 8 FORMAT (2X, SHU(B) = E12.5, 2X, SHU(A) = E12.5/) PRINTSI PRIVISZ PRINTSS 9 FORMAT (114.0MNX(A)=512.5.1X.5MNX(A)=612.5.1X.6MMX(A)=612.5.1X.6MMXPRINT34 PRINTSS PRIVISO 1(8).612.5/1 10 FORMAT (21, 5HNRAR-E12, 5, 21, 5HMRAR-E12, 5) PRINT37 END

.... 1 SUBROUTINE KSLT (X) COMMON DLTEMP RSLT 2 COMMON TEMP.EA.EAC.NUA.NUAC.EB. BC.NUB.NUBC.HA.HR.R.GJA.GJB.CA.CB.RSLT 3 10A.08.H.CACH.CAPCH.UNU.GAMA.GAMB.K(40).A(55).G(7).BT(30).FUTOA.FURSLT 2TOB , BDE 16331 , LOADL , AMISJI , LOADZ , ENIG. 71. FYXA, FNXA, FYXA, FMXU, FYX. FIR SLT 3X,FNGA,FN38,AC(3),KL1P,ELL,JELPH(20),V(5),AL(18),WH,DHH,DNH,WB,DHRSLT 6 48, DOWB, HODWH, WA, HWA, WU, DHU, DOWU, DDDWU, TAU, DTAU, WPJ, HHA, DWMA, HUA, ENR SLT 7 5UA RSLT 8 COMMON /SHEAR/ OA, QH, FO RSLT REAL NUA, NUAC, NUB, NUBC, NUNU, K, LOADI, LOADZ RSLT 10 10110+WW=AWW RSLT 11 DWWA = DWW RSLT 12 WUA=WU+ (HA/2.) +WA+ (HB/2.) +WB RSLT 13 RSLT 14 DHUA=DWU+ (HA/2.) + DWA+ (HB/2.) + DWH FNXA=CA+DWUA+(CA+'UA/R)+(WWA)-BT(5)/(L.-NUA)+BT(21) RSLT 15 FNX0=CH+D#U+(CD+NUB/R)+(H#)-BT(b)/(1.-NUB)+HT(22) RSLT 16 FNX=FNXA+FNXH RSLT 17 FMXA=DA+04A-RT(12)/(1.-NUA)+BT(1H) RSLT 18 FMXB=08+CWB-BT(13)/(1.-403)+3T(19) RSLT 19 FMX=FMXA+FMXB+(HA/2.+HB/2.)+FNXA RSLT 20 QA= [HA/12.] + TAU+ GAMA+ (WA+ DHW) RSLT 21 Q8= (H8/12.) + TAU+ GAH3+ (W8+ DWW) RSLT 22 FQ=QA+CB RSLT 23 RETURN RSLT 24 RSLT 25-END SUBROUTINE DINGO (EN,V) DIMENSION DUMMY(6) BNGO 2 DIMENSION EN(6.7). REN(6.6). C(6.1). V(6) BNGO 1 BNGO DO 1 1=1,6 4 RNGO DO 1 J=1.6 5 REN([+J)=EN([+J) BNGO 6 C(1,1)=F4(1,7) BNGD 1 1 CONTINUE 8160 8 CALL LEQ (REN.C.6.1.6.6.DET) BNGO 4 00 2 1=1.6 BNGS 10 V(1)=C(1,1) 84G0 11 2 CONTINUE BNGU 12 00 3 1=1.0 BNGO 13 DUMMY([]+EN([,1)+C(1,1)+EN(1,2)+C(2,1)+EN([,3)+C(3,1)+EN(1,4)+C(4,8)G2 14 11)+54(1,5)+C(5,1)+E4(1,6)+C(6,1)-E8(1,7) 8NG0 15 3 CONTINUE 8NG0 16 WRITE (9,4) WRITE (9,5) (DUMKY(1),1+1,6) BNGO LIN BHGO LAH RETURN BNGD 14 BNGO 20 4 FORMAT 143H SOLUTION CHECK BY SUBSTITUTION • BNGO 21 5 FORMAT (11, HHSHAR())=E12.5.11, HHMBAR(0)+E12.5.11, HHSPAR(0)+512.5/, AVG0 22 11X, 9HVBAR(40)+E12.5,1X, 7HMBAR(4))+E12.5,1X, 9HCBAR(40)+E12.5//) 8160 23 END BNG0 24-

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APPENDIX B Data

TABLE B.1

AVERAGE MATERIAL PROPERTIES FOR PG AND ATJ GRAPHITE

PG ATJ 3.1 x 10⁶ psi 2.26 x 10⁶ nsi Ε -0.21 + 0.30 ν + 0.90 + 0.25 νc varies with case 30 in. R 40 in. 40 in. L 1.43 x $10^{-6} \frac{\text{in}}{\text{in} - {}^{\circ}\text{F}}$ 13.1 x $10^{-6} \frac{\text{in}}{\text{in} - {}^{\circ}\text{F}}$ 4.25 x $10^{-6} \frac{\text{in}}{\text{in} - {}^{\circ}\text{F}}$ 4.25 x $10^{-6} \frac{\text{in}}{\text{in} - {}^{\circ}\text{F}}$ α °c





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APPENDIX C

DEFINITION OF TERMS

$$Z_{1} = (C_{a} + C_{b}) D ((\alpha_{17} + \alpha_{27} + \pi_{1} + \pi_{2}) - \frac{h}{2} D (\alpha_{47} + \pi_{4}))$$

$$+ (\frac{h}{2} C_{b} D^{2} + (\frac{C_{a} \vee_{a} + C_{b} \vee_{b}}{R_{a} R_{b}})) (\alpha_{37} + \alpha_{47} + \pi_{3} + \pi_{4})$$

$$Z_{2} = (C_{a} + C_{b}) (\alpha_{67} + \pi_{6} - \frac{5}{12} h_{b} (\alpha_{47} + \pi_{4}))$$

$$+ \frac{5}{12} h_{b} C_{b} (\alpha_{37} + \alpha_{47} + \pi_{3} + \pi_{4})$$

$$Z_{3} = (C_{a} + C_{b}) (\alpha_{57} + \pi_{5} - \frac{5}{12} h_{a} (\alpha_{47} + \pi_{4}))$$

$$+ \frac{5}{12} h_{a} C_{b} (\alpha_{37} + \alpha_{47} + \pi_{3} + \pi_{4})$$

$$Z_{4} = a_{31} Z_{1} - (a_{11} D^{2} + a_{15}) Z_{2}$$

$$Z_{5} = a_{23} D^{2} Z_{3} - (a_{31} D^{2} + a_{32}) Z_{2}$$

$$(C.1)$$

$$a_{11} = D_{a} (C_{a} + C_{b}) + \frac{C_{a} C_{b} h_{a} h}{4}$$

$$a_{12} = -\frac{C_{a} C_{b} h_{a}}{2} \frac{\psi_{a}}{R_{a}} - \frac{\psi_{b}}{R_{b}}$$

$$a_{13} = D_{b} (C_{a} + C_{b}) + \frac{C_{a} C_{b} h_{b} h}{4}$$

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$$a_{14} = \frac{h_b}{h_a} a_{12}$$

$$a_{15} = \frac{C_a C_b h}{2} \left(\frac{v_a}{R_a} - \frac{v_b}{R_b} \right)$$

$$a_{16} = \left(\frac{C_a v_a + C_b v_b}{R_a} \right)^2 - \left(\frac{C_a + C_b}{R_a} \right)^2$$

$$a_{21} = D_b (C_a + C_b) + \frac{5}{24} C_a C_b h_b^2$$

$$a_{22} = - (C_a + C_b) \frac{5}{6} G_b^b h_b$$

$$a_{23} = \frac{5}{24} C_a C_b h_a h_b$$

$$a_{24} = \frac{5}{12} C_c C_b h_b \left(\frac{v_a}{R_a} - \frac{v_b}{R_b} \right) + (C_a + C_b) \frac{5}{6} G_c^b h_b$$

$$a_{31} = D_a (C_a + C_b) + \frac{5}{24} C_a C_b h_a^2$$

$$a_{32} = - (C_a + C_b) \frac{5}{6} G_c^a h_a$$

$$a_{33} = a_{23}$$

$$a_{34} = \frac{5}{12} C_a C_b h_a \left(\frac{v_a}{R_a} - \frac{v_b}{R_b} \right) - \frac{5}{6} G_c^a h_a (C_a + C_b)$$

(c.2)

$$b_{11} = a_{13}a_{23} - a_{11}a_{21}$$

$$b_{12} = a_{14}a_{23} - a_{11}a_{22} - a_{21}a_{12}$$

$$b_{13} = -a_{12}a_{22}$$

$$b_{14} = a_{15}a_{23} - a_{11}a_{24}$$

$$b_{15} = a_{16}a_{23} - a_{12}a_{24}$$

$$b_{21} = a_{23}a_{23} - a_{31}a_{21}$$

$$b_{22} = -(a_{31}a_{22} + a_{32}a_{21})$$

$$b_{23} = -a_{32}a_{22}$$

$$b_{24} = a_{23}a_{34} - a_{31}a_{24}$$

$$b_{25} = -a_{32}a_{24}$$

(c.3)

$$g_{1} = b_{21} b_{14} - b_{11} b_{24}$$

$$g_{2} = b_{21} b_{15} + b_{22} b_{14} - b_{12} b_{24} - b_{12} b_{25}$$

$$g_{3} = b_{22} b_{15} + b_{23} b_{14} - b_{12} b_{25} - b_{13} b_{24}$$

$$g_{4} = b_{23} b_{15} - b_{13} b_{25}$$

$$(C.4)$$

$$L_{I}(x) = (b_{21} b_{14}^{4} + b_{22} b_{23}^{2} + b_{23}^{2}) t_{4}^{2} - (b_{11} b_{14}^{4} + b_{12} b_{2}^{2} + b_{13}^{2}) t_{5}^{2}$$

$$L_{II}(x) = t_{4}^{2}$$

$$L_{III}(x) = t_{2}^{2}$$

$$L_{IV}(x) = 1/(c_{a} + c_{b}) (a_{37} + a_{47} + a_{3} + a_{4})$$

$$L_{V}(x) = a_{47} + a_{4}$$

$$(C.5)$$

$$k_{1} = c_{a} b_{a}/2(c_{a} + c_{b})$$

$$k_{2} = C_{a}h_{b}/2(C_{a} + C_{b})$$

$$k_{3} = 1/R (C_{a}v_{a} + C_{b}v_{b})/(C_{a} + C_{b})$$

$$k_{4} = C_{b}$$

$$k_{5} = k_{8} = C_{b}v_{b}/R_{b}$$

$$k_{6} - C_{b}h_{b}^{2}/12$$

$$k_{7} = h_{b}/2$$

$$k_{9} = C_{b}/R_{b}^{2}$$

$$n = 1/3\left\{3(\frac{g_{3}}{g_{1}}) - (\frac{g_{2}}{g_{1}})^{2}\right\}$$

$$n = 1/27\left\{2 (\frac{g_{2}}{g_{1}})^{3} - 9 (\frac{g_{2}}{g_{1}}) (\frac{g_{3}}{g_{1}}) + 27 (\frac{g_{4}}{g_{1}})\right\}$$

$$(C.7)$$

$$A = \left\{-n/2 + n^{2}/4 + m^{3}/27\right\}^{1/3}$$

$$B = \left\{-n/2 - n^{2}/4 + m^{3}/27\right\}^{1/3}$$

$$(C.8)$$

$$\lambda_{1} = A + B - 1/3 (g_{2}/g_{1})$$

$$\lambda_{3} = \sqrt{\frac{3}{2}} (A - B)$$

$$r = (\lambda_{2})^{2} + (\lambda_{3})^{2}$$

$$\tan \theta_{1} = -\lambda_{3} / \lambda_{2}$$

$$\tan \theta_{2} = \lambda_{3} / \lambda_{2}$$

$$(C.10)$$

$$C_{1} = (\lambda_{1})^{1/2}$$

$$C_{2} = r^{1/4} \cos (\theta_{1}/2)$$

$$C_{3} = r^{1/4} \sin (\theta_{1}/2)$$

$$q = \int \frac{n^{2}}{4} + \frac{m^{3}}{27} \int \frac{1}{2}$$

$$(C.12)$$

$$C_{4} = (-n)^{1/3}$$

$$C_{5} = -1/2 \begin{cases} C_{4} + 3 (2q)^{1/3} \\ C_{4} - 3 (2q)^{1/3} \end{cases}$$

$$(C.13)$$

APPENDIX D

Derivation of Integrated Shear Stress Resultant

The required shear stress_strain relation can be developed by weighted integration in order to obtain the factor 5/6 that is generally accepted for isotropic plates and shells. The method follows that in reference (15). For convenience, the procedure for cylindrical shells is reproduced here.

Expressions for normal stress distributions with z can be obtained by replacing the strains in the stress-strain relations (1) by the approximate forms (8) and neglecting $(z/R)_i$ in comparison to unity in the same terms. It is to be understood that the following hold for each lamina.

$$\sigma_{x} = \frac{E}{1-v^{2}} \left(u_{0}^{\prime} + \frac{vW}{R} + z_{\beta} \right) - \frac{E\alpha T}{1-v} + \frac{vEW}{R(1-v^{2})}$$
(D.1)

$$\sigma_{\theta} = \frac{E}{1-v^2} \left(v u_0 + \frac{W}{R} + v z \beta \right) - \frac{E \alpha T}{1-v} + \frac{E \overline{W}}{R(1-v^2)}$$
(D.2)

Expressions for the stress distributions in terms of stress resultants and couples can be obtained by using equations (11) in (D.1) and (D.2).

$$\sigma_{x} = \frac{N_{x}}{h} + \frac{N_{Tx}}{(1-\nu)h} - \frac{\nu E}{Rh(1-\nu^{2})} \int_{-\frac{h}{2}}^{\frac{h}{2}} \overline{wdz} + \frac{12}{h^{3}} z \left[M_{x} + \frac{M_{Tx}}{1-\nu} - \frac{E}{R(1-\nu^{2})}\right]_{-\frac{h}{2}}^{\frac{h}{2}}$$

$$\overline{wzdz} - \frac{E \alpha T}{1-\nu} + \frac{\nu E \overline{w}}{R(1-\nu^{2})} \qquad (D.3)$$

$$\sigma_{\theta} = \frac{N_{\theta}}{h} + \frac{N_{T\theta}}{(1-\nu)h} - \frac{E}{Rh(1-\nu^2)} \int_{-\frac{h}{2}}^{\frac{h}{2}} \overline{wdz} + \frac{12}{h^3} \frac{z}{L} \left[M_{\theta} + \frac{M_{T\theta}}{1-\nu} \right]$$

$$\frac{E}{Rh(1-v^2)}\int_{-\frac{h}{2}}^{\frac{h}{2}} \overline{wzdz} - \frac{E\alpha T}{1-v} + \frac{E}{R(1-v^2)}$$
(D.4)

The shear stress is related to the normal stress by the equilibrium equations (2). If the first of these is integrated with respect to z, the following is obtained.

$$\sigma_{xz} - \tau_{2i} = \frac{1}{R} \int_{-\frac{h}{2}}^{z} \frac{\partial}{\partial x} (R\sigma_{x}) dz \qquad (D.5)$$

Using (D.3) in (D.5)

$$\sigma_{xz} = \tau_{2i} = -\frac{1}{Rh} \int_{-\frac{h}{2}}^{z} \left\{ RN_{x} + \frac{12}{h^{2}} z RM_{x} \right\} dz + \frac{1}{R} \int_{-\frac{h}{2}}^{z} \Omega dz \qquad (D.6)$$

where

$$\Omega = \frac{R}{1-v} \frac{\partial}{\partial x} \left\{ \frac{N_{Tx}}{h} + \frac{12z}{h^3} M_{Tx} - E\alpha T - \frac{vE}{(1+v)R} \left[\frac{1}{h} \int_{-\frac{h}{2}}^{\frac{h}{2}} \overline{w} dz + \frac{12z}{h^3} \int_{-\frac{h}{2}}^{\frac{h}{2}} \overline{w} dz - \overline{w} \right] \right\}$$

Refering to the integrated equilibrium equations (10) and replacing the normal stress resultants and couples in (D.5) by their equivalents in terms of the shear stress resultant.

$$\sigma_{xz} - \tau_{2i} = \frac{1}{h} \int_{-\frac{h}{2}}^{z} \left[-\frac{12z}{h^{2}} Q + (1 + \frac{6z}{h})\tau_{1i} - (1 - \frac{6z}{h})\tau_{2i} \right] dz + \frac{1}{R} \int_{-\frac{h}{2}}^{z} \Omega dz \quad (D.8)$$

Performing the indicated integration

$$\sigma_{xz} - \tau_{2i} = \frac{3}{2} \left[1 - \left(\frac{2z}{h}\right)^2 \right] \frac{0}{h} - \frac{\tau_{1i}}{4} \left[1 - \frac{4z}{h} - 3\left(\frac{2z}{h}\right)^2 \right] - \frac{\tau_{2i}}{4} \left[1 + \frac{4z}{h} - 3\left(\frac{2z}{h}\right)^2 \right] - \frac{\tau_{2i}}{4} \left[1 + \frac{4z}{h} - 3\left(\frac{2z}{h}\right)^2 \right] + \frac{1}{R} \int_{-\frac{h}{2}}^{z} \Omega dz$$
(D.9)

From (D.6) and equations (9), it can readily be shown that

The shear stress distribution (D.9) satisfies shear stress boundary conditions and the definition of the shear stress resultant. To prove the latter it is necessary to make use of (D.10) and

$$\int_{-\frac{h}{2}}^{\frac{h}{2}} \int_{-\frac{h}{2}}^{z} f(y) \, dy \, dz = \int_{-\frac{h}{2}}^{\frac{h}{2}} (\frac{h}{2} - z) f(z) \, dz \qquad (D.11)$$

McDonough (15) points out that the effect of the last term in (D.9) is to modify the classical quadratic shear stress distribution but not the magnitude of the shear stress resultant. The modification is due to the nonlinearity of the normal stress distribution, primarily its distribution with x.

Proceeding with the weighted integration as in (15), the shear stress-strain relation of the set (1) is multiplied by the weighting function $\left[1 - \left(\frac{2z}{h}\right)^2\right]$ and then integrated through the thickness of the shell to yield:

$$\int_{-\frac{h}{2}}^{\frac{h}{2}} \left[1 - \left(\frac{2z}{h}\right)^{2}\right] \sigma_{xz} dz = 2G_{c} \int_{-\frac{h}{2}}^{\frac{h}{2}} \left[1 - \left(\frac{2z}{h}\right)^{2}\right] G_{xz} dz \qquad (D.12)$$

The integral on the left hand side is evaluated using (D.9) with the aid of (D.10) and (D.11). The integral on the right hand side is evaluated by using the shear strain given in equation (8). After integration, rearrangement and simplification, equation (11A) results: • •
$$Q = \frac{\overline{m}}{6} + \frac{5}{6} G_{c}h (B_{i} + W_{i}') + \frac{5}{4} \int_{-\frac{h}{2}}^{\frac{h}{2}} \left[1 - (\frac{2z}{h})^{2}\right] G_{c}\overline{W}_{dz} + \frac{5}{4R} \int_{-\frac{h}{2}}^{\frac{h}{2}}$$

$$\left(\frac{2z}{h}\right)^{2} \int_{-\frac{h}{2}}^{z} \alpha dy dz$$

(D.13)

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| A theory for the analysis of ubjected to arbitrary axisymmetric eveloped. This theory, specific iffers from the classical thin s ransverse shear deformation and hrough the shell thickness. Solutions in several forms a aken by the solution function is | stresses in laminat ric mechanical and t cally for use with p shell theory in that transverse isotropy are developed for th | ed circular cylindrical shells hermal loadings has been yrolytic graphite type material it includes the effects of , as well as thermal expansion e governing equations. The form |
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| As a sample problem, the slo commercial graphite mandrel was c ehavior at the pyrolytic graphit ecrease in magnitude with increa- nickness (h_a/h_b) ratio. This imp- near are desirable to minimize to yrolytic graphite. | ow cooling of pyroly considered. Investig te - mandrel interfa- sing E/G ratio and olies that a thin man the possibilities of | tic graphite deposited onto a ation of normal and shear stres ce showed that these stresses increasing deposit to mandrel ndrel and a material weak in flaking and delamination of th |
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