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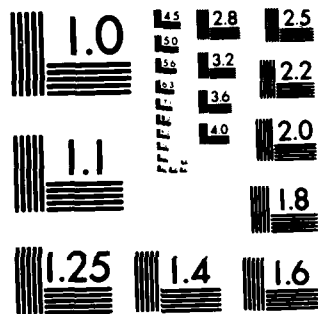   OCT 82 AFOSR-TR-83-1275 AFOSR-81-0253

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The activities done under the grant for the fiscal year 1982 are summarized. Primary emphasis has been the expansion of the applications of the Gelfand-Levitan formalism to provide examples of potentials for which the Schroedinger equation has unusual spectral properties and thereby generalize the kinds of spectral representation which one can have. The investigators have been partially successful in considering a case in which the potential is associated with a non-analytic reflection coefficient and a case in which the impulse response is a square pulse. The latter case may be of interest in providing passive means of convoluting a signal with a square pulse. Research directions which have led to publications are given by the papers which have been published, listed in the report.

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BOLLING AIR FORCE BASE
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1.0 RESEARCH DIRECTIONS

The principal direction of our research in the year
1 October 1981 - 30 September 1982 has been the expansion of
the applications of the Gelfand-Levitan formalism to provide
examples of potentials for which the Schroedinger equation has
unusual spectral properties and thereby generalize the kinds
of spectral representations which one can have. We have been
partially successful in considering a case in which the poten-
tial is associated with a non-analytic reflection coefficient
and a case in which the impulse response is a square pulse.
The latter case may be of interest in providing passive means
of convoluting a signal with a square pulse. Research direc-
tions which have led to publications are given by the papers
which have been published, which are listed below. Some were
accepted in the present fiscal year and were published in
1983. The list of the latter publications is included in the
bibliography in the yearly report for 1 October 1982 - 30
September 1983.

2.0 INTERACTIONS WITH OTHER SCIENTISTS

The author continued to work with Dr. P. B. Abraham, now of the Naval Research Laboratory, Prof. J. M. Cohen of the University of Pennsylvania, and Prof. R. T. Prosser of Dartmouth College. He continued to attend, organize and speak at a seminar at Massachusetts Institute of Technology.

3.0 PUBLICATIONS

1. "An Explicit Example of a Local and a Non-Local Potential Whose Hamiltonians are Unitarily Equivalent and Whose Scattering Operators are Identical" (with P. B. Abraham and B. DeFacio), Studies in App. Math., 66, 45 (1982).

2. "Exact Solutions of the One-Dimensional Acoustic Wave Equation for Several New Velocity Profiles. Transmission and Reflection Coefficient" (with P. B. Abraham), J. Acous. Soc., 71, 1391 (1982).