Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 SEP 1997		**00-00-1997 to 00-00-1997**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Wave Chaos and Chaotic Transmission of Waves	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **New York University,Courant Institute of Mathematical Sciences,251 Mercer St,New York,NY,10012**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a REPORT	b ABSTRACT	c THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**2**	

WAVE CHAOS AND CHAOTIC TRANSMISSION OF WAVES

George M. Zaslavsky
Courant Institute of Mathematical Sciences
New York University
251 Mercer St.
New York, NY 10012
Phone: (212) 998-3259; FAX: (212) 995-4121
E-mail: zaslav@cims.nyu.edu
Award No. N00014-97-1-0426
Long-range propagation

LONG-TERM GOAL

We are planning to study the origin of wave-chaos, the connection between ray-chaos and wave-chaos, and the kinetics of the long-distance wave propagation depending on different properties of the ocean natural waveguide. Our particular interest will be the study of statistical properties of arrving waves, role of Levy flights, and detailed investigation of the so-called logarithmic breakdown time for validity of the short-wave approximation.

SCIENTIFIC OBJECTIVES

1. We strongly believe that a realistic wave kinetics in the natural waveguides cannot be understood without the acknowledgement of an effective phase space topology for the equivalent ray-propagation problem. The “climate” along the propagating channel is crucial for obtaining the equivalent phase space topology.

2. The occurrence of the stochastic jets (ballistic trajectories) depends on the equivalent phase space topology and can be used for the wave propagation diagnostics. The presence of stochastic jets is related to special coherent wave structures. The conditions for the jets occurrence and the jets characteristic properties will be formulated.

3. On the basis of the information about the coherent rays structures, we want to develop a theory of the wave effects for the situation with anomalous ray kinetics. We expect a strong increase in the localization length and diffusion length as a result of the presence of stochastic jets in the ray-dynamics approximation.

APPROACH

To solve the formulated problems we will use methods of Hamiltonian chaos, methods of the anomalous kinetics developed in our works of the last few years, methods of quantum chaos. Simulation of ray dynamics and wave propagation will be effectively exploited, including high performance computations.

WORK COMPLETED

We have prepared a code for computing ray dynamics and statistics of ray arrivals.

RESULTS

For the realistic Munk-profile model of ocean existence of Levy-type flights is shown for ray dynamics. It is shown that a fractal dimension of the length of arrived waves depends on the phase space topology. On the basis of the results we formulated an idea of “cooling” of signals.

IMPACT/APPLICATION

We are going to develop a methodology for investigation of different statistical characteristics of the propagating rays, including their kinetics, in the situation of presence of dynamical chaos.

TRANSITIONS

N/A

RELATED PROJECTS

N/A