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FINAL REPORT ON CONTRACT N00014-76-C-0025(U) CALIFORNIA
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PLANETARY PHYSICS J W MILES 16 FEB 84 N00014-76-C-0025

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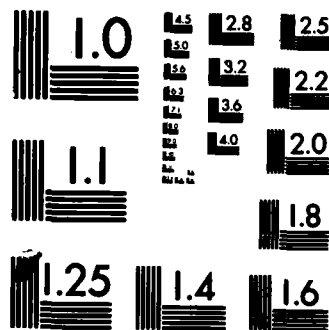
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17 February 1984

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Dr. C.M. Lee
Code 432F
Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217

Dear Dr. Lee:

This letter constitutes the final report on Contract NR 062-318 (430) for the period 1 July 1975 through 31 December 1983).

Research under this contract was primarily in the field of fluid mechanics, with emphasis on nonlinear waves and diffraction (of linear waves). This research was reported in a total of 50 papers (43 published, 4 in press, 4 sub judice) in the archival literature. The subject matter of these papers may be subdivided as follows (there is some overlap between these categories -- e.g. between solitary waves and nonlinear waves). The numbers refer to the parenthetic numbers in the attached list.

Applied mathematics (4): 237, 254, 268, 281

Diffraction and radiation (9): 274, 278, 279, 280, 282, 283, 285, 288, 289

Hamiltonian methods (2): 248, 277

Korteweg-deVries equation (3): 258, 259, 272

Nonlinear dynamics (6): 242, 293, 294, 295, 296, 299

Nonlinear waves (6): 251, 252, 262, 271, 297, 298

Solitary waves (14): 244, 245, 247, 249, 256, 263, 264, 265, 266, 267, 275, 276, 290, 300

Stability (1): 270

Wave damping (4): 239, 241, 260, 291

Miscellaneous (1): 269

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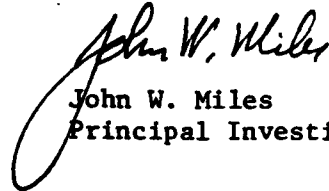
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Summaries of all of the above papers have been included in the quarterly progress reports and will not be repeated here.

Yours sincerely,



John W. Miles
Principal Investigator

JWM/dm
Encl.

cc: ONR Office, UCSD
ONR Office, Pasadena
J.F. Gilbert



AI

Research papers supported by ONR Contract NR 062-318 (430)

- (237)* "Asymptotic approximations for prolate spheroidal wave functions," Studies in Appl. Math. 54 315-349 (Dec. 1975)
- (239) Korteweg-deVries equation modified by viscosity," Phys. Fluids 19, 1063 (July, 1976)
- (241) "Damping of weakly nonlinear shallow-water waves," J. Fluid Mech. 76, 251-257 (July 1976)
- (242) "On internal resonance of two damped oscillators," Studies Appl. Math. 55, 351-359 (Dec., 1976)
- (244) "Obliquely interacting solitary waves," J. Fluid Mech. 79 157-169 (Jan., 1977)
- (245) "Resonantly interacting solitary waves," J. Fluid Mech. 79, 171-179 (Jan., 1977)
- (247) "Note on a solitary wave in a slowly varying channel," J. Fluid Mech. 80, 149-152 (April, 1977)
- (248) "On Hamilton's principle for surface waves," J. Fluid Mech. 83, 153-158 (Nov., 1977); Addendum, J. Fluid Mech. 85, 797 (April, 1978)
- (249) "Diffraction of solitary waves," ZAMP 28, 889-902 (1977)
- (251) "The Ursell paradox," Geofluidodynamical Wave Mathematics (Proceedings of Regional Research Conference in the Mathematical Sciences), pp. 103-110. Applied Mathematics Group, University of Washington (1977) *
- (252) "An axisymmetric Boussinesq wave," J. Fluid Mech. 84 181-191 (Jan., 1978)
- (254) "On the second Painlevé transcendent," Proc. Roy. Soc. Lond. A 361, 277-291 (June, 1978)
- (256) "On the evolution of a solitary wave for very weak nonlinearity," J. Fluid Mech. 87, 773-783 (August, 1978)
- (258) "The asymptotic solution of the Korteweg-deVries equation in the absence of solitons," Studies in Appl. Math. 60, 59-72 (1979)
- (259) "On the Korteweg-deVries equation for a gradually varying channel," J. Fluid Mech. 91, 181-190 (March, 1979)
- (260) "Damping of solitary waves," Phys. Fluids 22, 997 (May, 1979)
- (262) "The Boussinesq regime for waves in a gradually varying channel," 12th Symposium on Naval Hydrodynamics, National Academy of Sciences, Washington D.C., 523-528 (1979)
- (263) "On solitary Rossby waves," J. Atmos. Sci. 36, 1236-1238 (July, 1979)
- (264) "On internal solitary waves," Tellus 31 456-462 (Oct., 1979)
- (265) (With Peter Chang and W.K. Melville) "On the evolution of a solitary wave in a gradually varying channel," J. Fluid Mech. 95, 400-414 (Dec., 1979)
- (266) "Solitary waves," Ann. Rev. Fluid Mech. 12 11-43 (1980)

*The parenthetic numbers refer to the Principal Investigator's institutional bibliography.

- (267) "Guided solitary waves," Proc. Natl. Acad. Sci. 77, 1723-1724 (April, 1980)
- (268) "The second Painlevé transcendent: A nonlinear Airy function," Mechanics Today 5, 297-313 (1980)
- (269) "A note on the drag on a slowly moving body in an axisymmetric rotating flow," J. Fluid Mech. 100 35-40 (Sept., 1980)
- (270) "On Kelvin-Helmholtz instability," Phys. Fluids 23, 1915-1916 (Sept., 1980)
- (271) "Nonlinear Helmholtz oscillations in harbours and coupled basins," J. Fluid Mech. 104, 407-418 (March, 1981)
- (272) "The Korteweg-deVries equation: a historical essay," J. Fluid Mech. 106, 131-147 (May, 1981)
- (274) "Diffraction of gravity waves by a barrier reef," J. Fluid Mech. 109, 115-123 (August, 1981)
- (275) "On internal solitary waves, II" Tellus 33, 397-401 (August, 1981)
- (276) "An envelope-soliton problem," SIAM J. Appl. Math. 41, 227-230 (Oct., 1981)
- (277) "Hamiltonian formulations for surface waves," Appl. Sci. Res. 37, 103-110 (Oct., 1981)
- (278) "Oblique surface-wave diffraction by cylindrical obstacles," Dyn of Atmos. and Oceans 6, 121-123 (Dec., 1981)
- (279) "A note on edge waves on a flat shelf," Geophys. Astrophys. Fluid Dyn. 18, 243-251 (Dec., 1981)
- (280) (With V.T. Buchwald) "On resonance of an offshore channel," Aust. J. Mar. Freshwater Res. 32, 833-841 (1981)
- (281) "On a nonlinear Bessel equation," SIAM J. Appl. Math. 42, 109-112 (Feb., 1982)
- (282) "On surface-wave diffraction by a trench," J. Fluid Mech. 115, 315-325 (Feb., 1982)
- (283) "On Rayleigh scattering by a grating," Wave Motion 4, 285-292 (July, 1982)
- (285) "On surface-wave radiation from a submerged cylindrical duct," J. Fluid Mech. 122, 339-346 (Sept., 1982)
- (288) "Surface-wave interaction with a deeply submerged circular duct," J. Austral Math. Soc. 25, 84-93 (May, 1983)
- (289) "Surface-wave diffraction by a periodic row of submerged ducts," J. Fluid Mech. 128, 155-180 (March, 1983)
- (290) "Solitary wave evolution over a gradual slope with turbulent friction," J. Phys. Ocean. 13, 551-553 (March, 1983)
- (291) "Wave evolution over a gradual slope with turbulent friction," J. Fluid Mech. 133, 207-216 (August, 1983)
- (293) "Resonant motion of a spherical pendulum," Physica D (in press)
- (294) "Strange attractors in fluid dynamics," Advances in Applied Mechanics 24 (in press)
- (295) "Resonant non-planar motion of a stretched string," JASA, (in press)
- (296) "Resonantly forced motion of two quadratically coupled oscillators" Physica D, (in press)

- (297) "Nonlinear Faraday resonance" (submitted to JFM, 1/23/84)
- (298) "Internally resonant surface waves in a circular cylinder" (submitted to JFM, 2/10/84)
- (299) "Chaotic motion of a weakly nonlinear, modulated oscillator," (submitted to Proceedings NAS, 2/17/84)
- (300) (with S.C. Cheung) "Two-dimensional interactions of sine-Gordon solitons" (submitted to Physica D)

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