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### **Education**

- University of Delaware, Newark, Delaware.  
Ph.D., Applied Sciences (Civil Engineering), 1983
- Brown University, Providence, Rhode Island.  
Sc.B.(magna cum laude), Environmental Engineering, 1975.  
Sc.M., Engineering Mechanics, 1976.

### **Professional Experience**

- Edward C. Davis Professor of Civil Engineering, Department of Civil and Environmental Engineering, University of Delaware, 2003-present.
- Visiting Professor, Grupo de Dinámica de Flujos Ambientales, CEAMA, Universidad de Granada, 2010, 2012.
- Professor of Civil and Environmental Engineering, Department of Civil and Environmental Engineering, University of Delaware, 1994-2002. Secondary appointment in College of Earth, Ocean and the Environment, University of Delaware, 1994-present.
- Associate Professor of Civil Engineering, Department of Civil Engineering, University of Delaware, 1989-1994. Secondary appointment in College of Marine Studies, University of Delaware, as Associate Professor, 1989-1994.
- Associate Professor, Coastal and Oceanographic Engineering Department, University of Florida, 1988.
- Assistant Professor, Coastal and Oceanographic Engineering Department, University of Florida, 1984-1988.
- Assistant Professor, Marine Sciences Research Center, State University of New York at Stony Brook, 1983-1984.
- Graduate Research Assistant, Department of Civil Engineering, University of Delaware, 1979-1983.
- Principle Research Engineer, Alden Research Laboratory, Worcester Polytechnic Institute, 1979.
- Research Engineer, Alden Research Laboratory, Worcester Polytechnic Institute, 1977-1979.

## Technical Societies

- American Society of Civil Engineers (ASCE)
  - Waterway, Port, Coastal and Ocean Engineering Division. (Now COPRI, the Coastal, Ocean, Port and River Institute).
    - \* Member, Organizing Committee, *Coastal Hydrodynamics '87*, Newark, June 1987.
    - \* Member, Publications Committee, 1987-2002.
    - \* Member, Technical Committee, *WAVES '01*, San Francisco, September 2001.
    - \* Member, Scientific Committee, *33d International Conference on Coastal Engineering*, Santander, 2012.
    - \* Member, Scientific Committee, *34th International Conference on Coastal Engineering*, Seoul, 2014.
  - Engineering Mechanics Division
    - \* Member, Fluids Committee, 1991-present.
    - \* Organizer, Wave Hydrodynamics sessions, *Joint SES-ASME-ASCE Meeting*, Charlottesville, June 1993.
    - \* Vice-Chairman, Fluids Committee, 1993-1994.
    - \* Chairman, Fluids Committee, 1994 - 1996.
    - \* Organizer, session on Breaking Waves and Turbulence, *10th Engineering Mechanics Division Specialty Conference*, Boulder, May 1995.
    - \* Member, Organizing Committee, *17th Engineering Mechanics Conference*, Newark, DE, June 2004.
- American Geophysical Union (AGU)
  - Organizer, Nearshore Hydrodynamics sessions, *American Geophysical Union Fall Meeting*, December 1992.
  - Member, Governing Board, American Institute of Physics, 2011-2013.
  - Organizer, Natural Hazards sessions on inundation, AGU Fall Meeting, 2012.
- American Physical Society
- Coastal and Estuarine Research Federation
- United States Association for Computational Mechanics
- Geological Society of America

## Service on editorial boards

- Associate Editor, *Journal of Engineering Mechanics*, ASCE, 1994 - 1996.
- Assistant Editor, *Journal of Waterway, Port, Coastal and Ocean Engineering*, ASCE, 1994 - 1996.
- Editor, *Journal of Waterway, Port, Coastal and Ocean Engineering*, ASCE, 1996 - 2000.
- Editor, *Journal of Geophysical Research - Oceans*, AGU, 2003-2006.
- Editor in Chief, *Journal of Geophysical Research - Oceans*, AGU, 2006-2009.
- Associate Editor, *Journal of Marine Energy and Ocean Engineering*, Springer, 2015-present.
- Associate Editor, *Journal of Fluid Mechanics*, Cambridge University Press, 2017-present.
- Editorial Board, *Coastal Engineering*, Elsevier, 2017-present.

## Technical and Academic Advisory Panels and Committees

- Member, Advisory Committee, NSF Network for Earthquake Engineering and Simulation (NEES), Tsunami Basin Project, 2001-2005.
- Member, NSF Physical Oceanography Review Panel, May 2002.
- Co-organizer, NSF Workshop on model validation and benchmarking for tsunami generation by submarine mass failure, University of Hawaii, May 30-31, 2003.
- Member, Nearshore Advisory Group - informal advisory panel appointed to assist ONR and NSF program managers in areas of nearshore physical oceanography.
- National Advisory Board, Department of Naval Architecture and Marine Engineering, University of Michigan, 2005-2008.
- Member (East Coast Technical Representative), Coordinating Committee, National Tsunami Hazard Mitigation Program, NOAA, 2008-present.
- Mapping and Modeling Subcommittee, National Tsunami Hazard Mitigation Program, NOAA, 2008-present.
- Member, NSF CBET Review Panel, January 2009.
- Member, ERDC External Advisory Panel on Boussinesq Models, 2014 - present.
- Organizer, NTHMP Landslide Tsunami Modeling Workshop, Galveston, TX, Jan 9-11, 2017.
- Member, Academic Program Review team for Department of Ocean Engineering, Texas A & M University, 2018.
- Member, Organizing Committee, THETIS '19, Newark, DE.

## Prizes and Honors

- Walter L. Huber Civil Engineering Research Prize, American Society of Civil Engineers, 1992.
- John G. Moffatt - Frank E. Nichol Harbor and Coastal Engineering Award, American Society of Civil Engineers, 2011.
- International Coastal Engineering Award, COPRI, American Society of Civil Engineers, 2018.

## Research Interests

Historically, my largest research contribution has been in the development of open source models for nearshore processes. My research group has been responsible for the development of the parabolic refraction/diffraction model REF/DIF, the Boussinesq model FUNWAVE, and the 3D nonhydrostatic model NHWAVE. In addition, we have developed the NearCoM model, which couples an extensive rewrite and extension of the quasi-3D wave averaged circulation model Shorecirc to the spectral wave model SWAN. Model codes are available from

1. <http://github.com/fengyanshi/FUNWAVE-TVD>
2. <http://github.com/JimKirby/NHWAVE>
3. <http://github.com/fyshi/NearCoM>

or by contacting me at [kirby@udel.edu](mailto:kirby@udel.edu) Presently funded work topics include landslide-tsunami modeling, tsunami inundation mapping and hazard analysis, dynamics of frontal structures and stratified shear flow in estuaries and river mouths, ocean surface wave breaking and bubble injection, and dynamics and long term evolution and resilience of salt marshes.

## PUBLICATIONS

### Citation statistics

- Web of Science, 6/27/2018: 6,438 citations, h-index = 39
- Google Scholar, 6/15/2018: 14,139 citations, h-index = 53

### Edited Proceedings

1. Kaliakin, V. N., Kirby, J. T., Yamamuro, J., Bhattacharya, B. and Shenton, H. W. (eds), EM2004, The 17th ASCE Engineering Mechanics Conference, Newark, June 13-16, 2004. Published on CD.

### Chapters in Books

1. Kirby, J. T., 1997, "Nonlinear, dispersive long waves in water of variable depth", *Advances in Fluid Mechanics*, **10**, J. N. Hunt (ed), Computational Mechanics Publ., 55 - 125.
2. Martin, P. A., Dalrymple, R. A. and Kirby, J. T., 1997, "Parabolic modeling of water waves", *Advances in Fluid Mechanics*, **10**, J. N. Hunt (ed), Computational Mechanics Publ., 169 - 213.
3. Kirby, J. T., 2003, "Boussinesq models and applications to nearshore wave propagation, surfzone processes and wave-induced currents", in *Advances in Coastal Modeling*, V. C. Lakhan (ed), Elsevier, 1-41.

### Refereed Journal Articles

1. Kirby, J.T., Dalrymple, R.A. and Liu, P.L.-F., 1981, "Modification of edge waves by barred-beach topography", *Coastal Engineering*, **5**, 35-49, doi:10.1016/0378-3839(81)90003-X.
2. Kirby, J.T. and Dalrymple, R.A., 1983, "Propagation of obliquely incident water waves over a submerged trench", *Journal of Fluid Mechanics*, **133**, 47-63, doi:10.1017/S0022112083001780.
3. Kirby, J.T. and Dalrymple, R.A., 1983, "Oblique envelope solutions of the Davey-Stewartson equations in intermediate water depth", *Physics of Fluids*, **26**, 2916-2918, doi:10.1063/1.864056.
4. Kirby, J.T. and Dalrymple, R.A., 1983, "A parabolic equation for the combined refraction-diffraction of Stokes waves by mildly-varying topography", *Journal of Fluid Mechanics*, **136**, 453-466, doi:10.1017/S0022112083002232.
5. Kirby, J.T., 1984, "A note on linear surface wave-current interaction over slowly varying topography", *Journal of Geophysical Research*, **89**, 745-747, doi:10.1029/JC089iC01p00745.
6. Dalrymple, R.A., Kirby, J.T. and Hwang, P.A., 1984, "Wave diffraction due to areas of energy dissipation", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **110**, 67-79, doi:10.1061/(ASCE)0733-950X(1984)110:1(67).
7. Kirby, J.T. and Dalrymple, R.A., 1984, "Verification of a parabolic equation for propagation of weakly-nonlinear waves", *Coastal Engineering*, **8**, 219-232, doi:10.1016/0378-3839(84)90002-4.
8. Liu, P.L.-F., Yoon, S.B. and Kirby, J.T., 1985, "Nonlinear refraction-diffraction of waves in shallow water" *Journal of Fluid Mechanics*, **153**, 184-201, doi:10.1017/S0022112085001203.
9. Kirby, J.T., 1986, "A general wave equation for waves over rippled beds", *Journal of Fluid Mechanics*, **162**, 171-186, doi:10.1017/S0022112086001994.
10. Kirby, J. T., 1986, "On the gradual reflection of weakly-nonlinear Stokes waves in regions with varying topography", *Journal of Fluid Mechanics*, **162**, 187-209, doi:10.1017/S0022112086002008.
11. Kirby, J. T. and Dalrymple, R. A., 1986, "Modelling waves in surfzones and around islands", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **112**, 78-93, doi:10.1061/(ASCE)0733-950X(1986)112:1(78).

12. Kirby, J. T., 1986, "Higher-order approximations in the parabolic equation method for water waves", *Journal of Geophysical Research*, **91**, 933-952, doi:10.1029/JC091iC01p00933.
13. Dalrymple, R. A. and Kirby, J. T., 1986, "Water waves over ripples", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **112**, 309-319, doi:10.1061/(ASCE)0733-950X(1986)112:2(309).
14. Kirby, J. T. and Dalrymple, R. A., 1986, "An approximate model for nonlinear dispersion in monochromatic wave propagation models", *Coastal Engineering*, **9**, 545-561, doi:10.1016/0378-3839(86)90003-7, and reply to discussions, **11**, 87-92, 1987, doi:10.1016/0378-3839(87)90041-X.
15. Kirby, J. T., 1986, "Open boundary condition in the parabolic equation method", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **112**, 460-465, doi:10.1061/(ASCE)0733-950X(1986)112:3(460).
16. Kirby, J. T., 1986, "Rational approximations in the parabolic equation method for water waves", *Coastal Engineering*, **10**, 355-378, doi:10.1016/0378-3839(86)90021-9.
17. Kirby, J. T., Dalrymple, R. A. and Seo, S. N., 1987, "Propagation of obliquely incident water waves over a trench 2. Currents flowing along the trench" *Journal of Fluid Mechanics*, **176**, 95-116, doi:10.1017/S0022112087000582.
18. Kirby, J. T., 1988, "Current effects on resonant reflection of surface water waves by sand bars", *Journal of Fluid Mechanics*, **186**, 501-520, doi:10.1017/S0022112088000242.
19. Dalrymple, R. A. and Kirby, J. T., 1988, "Models for very wide-angle water waves and wave diffraction", *Journal of Fluid Mechanics*, **192**, 33-50, doi:10.1017/S0022112088001776.
20. Kirby, J. T. and Vengayil, P., 1988, "Non-resonant and resonant reflection of long waves in varying channels", *Journal of Geophysical Research*, **93**, 10,782-10,796, doi:10.1029/JC093iC09p10782.
21. Kirby, J. T., 1988, "Parabolic wave computations in non-orthogonal coordinate systems", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **114**, 673-685, doi:10.1061/(ASCE)0733-950X(1988)114:6(673).
22. Kirby, J. T. and Chen, T-M., 1989, "Surface waves on vertically sheared flows: approximate dispersion relations", *Journal of Geophysical Research*, **94**, 1013-1027, doi:10.1029/JC094iC01p01013.
23. Dalrymple, R. A., Suh, K., Kirby, J. T. and Chae, J. W., 1989, "Models for very wide-angle water waves and wave diffraction. Part 2. Irregular bathymetry", *Journal of Fluid Mechanics*, **201**, 299-322, doi:10.1017/S0022112089000959.
24. Kirby, J. T., 1989, "A note on parabolic radiation boundary conditions for elliptic wave calculations", *Coastal Engineering*, **13**, 211-218, doi:10.1016/0378-3839(89)90049-5.
25. Kirby, J. T., 1989, "Propagation of surface waves over an undulating bed", *Physics of Fluids A*, **1**, 1898-1899, doi:10.1063/1.857515.
26. Dalrymple, R. A., Munasinghe, L. C., Wood, D. H. and Kirby, J. T., 1990, "A very wide angle acoustic model for underwater sound propagation", *Journal of the Acoustical Society of America*, **88**, 1863-1876, doi:10.1121/1.400209.
27. Suh, K. D., Dalrymple, R. A. and Kirby, J. T., 1990, "An angular spectrum model for propagation of Stokes waves", *Journal of Fluid Mechanics*, **221**, 205-232, doi:10.1017/S0022112090003548.
28. Kirby, J. T., 1991, "Intercomparison of truncated series solutions for shallow water waves", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **117**, 143-155, doi:10.1061/(ASCE)0733-950X(1991)117:2(143).
29. Bailard, J. A., DeVries, J. W. and Kirby, J. T., 1992, "Considerations in using Bragg reflection for storm erosion protection", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **118**, 62-74, doi:10.1061/(ASCE)0733-950X(1992)118:1(62).
30. Dalrymple, R. A. and Kirby, J. T., 1992, "Angular spectrum modelling of water waves", *CRC Reviews in Aquatic Sciences*, **6**, 383-404.

31. Kirby, J.T., 1993, "A note on Bragg scattering of surface waves by sinusoidal bars", *Physics of Fluids A*, **5**, 380-386, doi:10.1063/1.858861.
32. Kirby, J.T. and Lee, C., 1993, "Short waves in a rotating, shallow tank with bathymetry: a model equation in the mild-slope approximation", *SIAM Journal of Applied Mathematics*, **53**, 1381-1400, 10.1137/0153065.
33. Mase, H. and Kirby, J. T., 1993, "Hybrid model for nonlinear transformation of random waves", *Transactions Japanese Society of Civil Engineers*, No. 479-25, 91-100. (in Japanese)
34. Kirby, J. T., Dalrymple, R. A. and Kaku, H., 1994, "Parabolic approximations for water waves in conformal coordinate systems", *Coastal Engineering*, **23**, 185-213, doi:10.1016/0378-3839(94)90001-9.
35. Ting, F. C. K. and Kirby, J. T., 1994, "Observations of undertow and turbulence in a laboratory surfzone", *Coastal Engineering*, **24**, 51-80, doi:10.1016/0378-3839(94)90026-4.
36. Dalrymple, R. A., Kirby, J. T. and Martin, P. A., 1994, "Spectral methods for forward-propagating water waves in conformally-mapped channels", *Applied Ocean Research*, **16**, 249-266, doi:10.1016/S0141-1187(94)90015-9.
37. Lee, C. H. and Kirby, J. T., 1994, "Analytical comparison of time-dependent mild-slope equations", *Journal of the Korean Society of Coastal and Ocean Engineers*, **6**, 389-396.
38. Ting, F. C.-K. and Kirby, J. T., 1995, "Dynamics of surf-zone turbulence in a strong plunging breaker", *Coastal Engineering*, **24**, 177-204, doi:10.1016/0378-3839(94)00036-W.
39. Wei, G., Kirby, J. T., Grilli, S. T. and Subramanya, R., 1995, "A fully nonlinear Boussinesq model for surface waves. I. Highly nonlinear, unsteady waves", *Journal of Fluid Mechanics*, **294**, 71-92, doi:10.1017/S0022112095002813.
40. Kaihatu, J. M. and Kirby, J. T., 1995, "Nonlinear transformation of waves in finite water depth", *Physics of Fluids*, **7**, 1903-1914, doi:10.1063/1.868504.
41. Wei, G. and Kirby, J. T., 1995, "A time-dependent numerical code for extended Boussinesq equations", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **121**, 251-261, doi:10.1061/(ASCE)0733-950X(1995)121:5(251).
42. Ting, F. C.-K. and Kirby, J. T., 1996, "Dynamics of surf-zone turbulence in a spilling breaker", *Coastal Engineering*, **27**, 131-160, doi:10.1016/0378-3839(95)00037-2.
43. Walker, C. A., Kirby, J. T. and Dentel, S. K., 1996, "The streaming current detector: a quantitative model", *Journal of Colloid and Interface Science*, **182**, 71-81, doi:10.1006/jcis.1996.0438.
44. Chajes, M. J., Finch, W. W. and Kirby, J. T., 1996, "Dynamic analysis of a ten-story reinforced concrete building using a continuum model", *Computers and Structures*, **58**, 487-498, doi:10.1016/0043-7949(95)00166-E.
45. Chajes, M. J., Zhang, L. and Kirby, J. T., 1996, "Dynamic analysis of tall building using reduced-order continuum model", *Journal of Structural Engineering*, **122**, 1284-1291, doi:10.1061/(ASCE)0733-9443(1996)122:11(1284).
46. Özkan-Haller, H. T. and Kirby, J. T., 1997, "A Fourier-Chebyshev collocation method for the shallow water equations including shoreline runup", *Applied Ocean Research*, **19**, 21-34, doi:10.1016/S0141-1187(97)00011-4.
47. Kaihatu, J. M. and Kirby, J. T., 1998, "Two-dimensional parabolic modeling of extended Boussinesq equations", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **124**, 57-67, doi:10.1061/(ASCE)0733-950X(1998)124:2(57).
48. Chawla, A., Özkan-Haller, H. T. and Kirby, J. T., 1998, "Spectral model for wave transformation over irregular bathymetry", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **124**, 189-198, doi:10.1061/(ASCE)0733-950X(1998)124:4(189).

49. Wei, G., Kirby, J. T. and Sinha, A., 1999, "Generation of waves in Boussinesq models using a source function method", *Coastal Engineering*, **36**, 271-299, doi:10.1016/S0378-3839(99)00009-5.
50. Chen, Q., Dalrymple, R. A., Kirby, J. T., Kennedy, A. and Haller, M. C., 1999, "Boussinesq modeling of a rip current system" , *Journal of Geophysical Research*, **104**, 20,617 - 20, 637, doi:10.1029/1999JC900154.
51. Özkan-Haller, H. T. and Kirby, J. T., 1999, "Nonlinear evolution of shear instabilities of the longshore current: A comparison of observations and computations", *Journal of Geophysical Research*, **104**, 25,953 - 25,984, doi:10.1029/1999JC900104.
52. Gobbi, M. F. and Kirby, J. T., 1999, "Wave evolution over submerged sills: Tests of a high-order Boussinesq model", *Coastal Engineering*, **37**, 57-96, doi:10.1016/S0378-3839(99)00015-0, and erratum, **40**, 277, 2000, doi:10.1016/S0378-3839(00)00022-3.
53. Kennedy, A. B., Chen, Q., Kirby, J. T., and Dalrymple, R. A., 2000, "Boussinesq modeling of wave transformation, breaking and runup. I: One dimension", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **126**, 39-47, doi:10.1061/(ASCE)0733-950X(2000)126:1(39).
54. Gobbi, M. F., Kirby, J. T. and Wei, G., 2000, "A fully nonlinear Boussinesq model for surface waves. II. Extension to  $O(kh^4)$ " , *Journal of Fluid Mechanics*, **405**, 181-210, doi:10.1017/S0022112099007247.
55. Chawla, A. and Kirby, J. T., 2000, "A source function method for generation of waves on currents in Boussinesq models", *Applied Ocean Research*, **22**, 75-83, doi:10.1016/S0141-1187(00)00005-5.
56. Kennedy, A. B., Dalrymple, R. A., Kirby, J. T. and Chen, Q., 2000, "Determination of inverse depths using direct Boussinesq modelling", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **126**, 206-214, doi:10.1061/(ASCE)0733-950X(2000)126:4(206).
57. Chen, Q., Kirby, J. T., Dalrymple, R. A., Kennedy, A. B. and Chawla, A., 2000, "Boussinesq modeling of wave transformation, breaking and runup. II: Two horizontal dimensions", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **126**, 48-56, doi:10.1061/(ASCE)0733-950X(2000)126:1(48).
58. Svendsen, I. A., Veeramony, J., Bakunin, J. and Kirby, J. T., 2000, "The flow in weak turbulent hydraulic jumps", *Journal of Fluid Mechanics*, **418**, 25-57, doi:10.1017/S0022112000008867.
59. Kennedy, A. B., Kirby, J. T., Chen, Q. and Dalrymple, R. A., 2001, "Boussinesq-type equations with improved nonlinear behaviour", *Wave Motion*, **33**, 225-243, doi:10.1016/S0165-2125(00)00071-8.
60. Shi, F., Dalrymple, R. A., Kirby, J. T., Chen, Q. and Kennedy, A., 2001, "A fully nonlinear Boussinesq model in generalized curvilinear coordinates", *Coastal Engineering*, **42**, 337-358, doi:10.1016/S0378-3839(00)00067-3.
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62. Chawla, A. and Kirby, J. T., 2002, "Monochromatic and random wave breaking at blocking points", *Journal of Geophysical Research*, **107(C7)**, doi:10.1029/2001JC001042.
63. Misra, S. K., Kennedy, A. B. and Kirby, J. T., 2003, "An approach to determining nearshore bathymetry using remotely sensed ocean surface dynamics", *Coastal Engineering*, **47**, 265-293, doi:10.1016/S0378-3839(02)00118-7.
64. Shi, F., Kirby, J. T., Dalrymple, R. A., Chen, Q., 2003, "Wave simulations in Ponce de Leon Inlet using a Boussinesq model", *Journal of Waterway, Port, Coastal and Ocean Engineering*, **129**, 124-135, doi:10.1061/(ASCE)0733-950X(2003)129:3(124).
65. Kennedy, A. B. and Kirby, J. T., 2003, "An unsteady wave driver for narrow-banded waves: Modeling nearshore circulation driven by wave groups", *Coastal Engineering*, **48**, 257-275, doi:10.1016/S0378-3839(03)00031-0.

66. Shi, F., Svendsen, I. A., Kirby, J. T. and Smith, J. M., 2003, "A curvilinear version of a quasi-3D nearshore circulation model", *Coastal Engineering*, **49**, 99-124, doi:10.1016/S0378-3839(03)00049-8.
67. Watts, P., Grilli, S. T., Kirby, J. T., Fryer, G. J. and Tappin, D. R., 2003, "Landslide tsunami case studies using a Boussinesq model and a fully nonlinear tsunami generation model", *Natural Hazards and Earth System Sciences*, **3**, 391-402, doi:10.5194/nhess-3-391-2003.
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71. Shi, F. and Kirby, J. T., 2005, "Curvilinear parabolic approximation for surface wave transformation using covariant-contravariant tensor method", *Journal of Computational Physics*, **204**, 562-586, doi:10.1016/j.jcp.2004.10.022.
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78. Long, W., Kirby, J. T. and Shao, Z., 2008, "A numerical scheme for morphological bed level calculations", *Coastal Engineering*, **55**, 167-180, doi:10.1016/j.coastaleng.2007.09.009.
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156. Derakhti, M. and Kirby, J. T., 2016, "Large-scale vortex generation and evolution in short-crested isolated wave breaking", *AGU Fall Meeting*, Abstract OS23B-2020, San Francisco, December 12-16.
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2. "Acceleration effects in a time-resolved cross-shore sediment transport model", College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, June 3, 2003.
3. "A progress report on various applications of the Boussinesq equations", Department of Civil and Environmental Engineering, University of Delaware, Newark, November 11, 2003.

4. "From surf to tsunami: modeling weakly dispersive shallow water waves", Inaugural lecture, E. C. Davis Professorship, College of Engineering, University of Delaware, October 5, 2004.
5. "Lectures on Boussinesq wave modeling", College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, August 2005.
6. "Modeling the 2004 Sumatra tsunami", Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, April 13, 2006.
7. "The 2004 Indian Ocean tsunami: Source determination and runup in Thailand", Department of Civil and Environmental Engineering, University of Delaware, April 2007.
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9. "Applications of Boussinesq models to surf zone flows: shear waves, rip currents and mixing", Grupo de Dinámica de Flujos Ambientales, CEAMA, Univ. de Granada, May 2010.
10. "The 2011 Tohoku tsunami: missing pieces of the puzzle?", Grupo de Dinámica de Flujos Ambientales, CEAMA, Univ. de Granada, May 2012.
11. "Multiple source mechanisms for the 2011 Tohoku-oki tsunami", Physical Ocean Sciences and Engineering, College of Earth, Ocean and Environment, University of Delaware, November 2012.
12. "Modeling ocean waves at a variety of scales", Department of Civil Engineering, Notre Dame University, March 25, 2014.
13. "Surface waves on strongly sheared currents", Applied Ocean Sciences and Engineering, Woods Hole Oceanographic Institution, Sept. 10, 2015.
14. "Dynamics of short-crested breaking waves", Dept. of Energy and Process Engineering, Norwegian University of Science and Technology, Trondheim, Sept. 20, 2017

#### **OTHER PUBLIC PRESENTATIONS**

1. "Modeling tsunamis: Science issues and social impacts", Marine Associates Meeting, College of Marine Studies, University of Delaware, March 22, 2005.
2. "Hydrodynamics of tsunami waves", Delaware Academy of Sciences, May 18, 2005.
3. "From surf to tsunami: modeling water waves from nearshore to oceanic scale", Ocean Currents Series Lecture, College of Marine Studies, Lewes, June 16, 2005.
4. "From surf to tsunami: modeling water waves from nearshore to oceanic scale", Academy of Life Long Learning, Wilmington, Sept. 28, 2005.

#### **Other Activities**

1. Judge, Sophomore Science Fair, Charter School of Wilmington, Wilmington, DE, January 9, 2004.

#### **FUNDED RESEARCH PROJECTS (University of Delaware)**

1. Project title: Studies of Methods for Wave Field and Mean Flow Modification near Open Coastlines  
 Sponsor: Office of Naval Research  
 Sponsor's Grant Number:  
 P.I.: James T. Kirby  
 Duration: 01/01/1990 - 12/31/1990  
 Amount of support: \$70,000

2. Project title: Sloshing and Wave Breaking in a Rectangular Container  
 Sponsor: University of Delaware Research Foundation  
 Sponsor's Grant Number:  
 P.I.: James T. Kirby  
 Duration: 06/01/1990 - 05/31/1991  
 Amount of support: \$17,000
  
3. Project title: Modelling Effects of Vertical Current Shear in Wave Propagation Schemes  
 Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
 Sponsor's Grant Number: R/OE-9  
 P.I.: James T. Kirby  
 Duration: 02/01/1991 - 01/31/1993  
 Amount of support: \$111,198
  
4. Project title: Enhancements and extension to the program REF/DIF 1  
 Sponsor: U. S. Army Corps of Engineers, Coastal Engineering Research Center  
 Sponsor's Grant Number: DACW 39-90-D-0006-D002  
 P.I.: James T. Kirby  
 Duration: 01/01/1992 - 12/31/1992 ?  
 Amount of support: \$39,697
  
5. Project title: Nearshore Wave and Circulation Modelling  
 Sponsor: Army Research Office (University Research Initiative)  
 Sponsor's Grant Number: DAAL03-92-G-0116  
 P.I.: Robert A. Dalrymple, James T. Kirby, Ib A Svendsen, Nobu Kobayashi, John D. McCalpin, Philip L. F. Liu (Cornell University)  
 Duration: 07/01/1992 - 06/30/1997  
 Amount of support: ~ \$2,000,000
  
6. Project title: Spectral Wave Evolution Near Tidal Inlets  
 Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
 Sponsor's Grant Number: R/OE-13  
 P.I.: James T. Kirby  
 Duration: 02/01/1993 - 01/31/1995  
 Amount of support: \$126,500
  
7. Project title: Studies of Finite Amplitude Shear Wave Instabilities  
 Sponsor: Office of Naval Research, Coastal Dynamics Program  
 Sponsor's Grant Number: N00014-94-1-0214  
 P.I.: James T. Kirby  
 Duration: 01/01/1994 - 12/31/97  
 Amount of support: \$162,621
  
8. Project title: Study of Breaking Wave Dynamics  
 Sponsor: National Science Foundation, Physical Oceanography Program  
 Sponsor's Grant Number: OCE-9203277  
 P.I.s: Ib A. Svendsen, James T. Kirby and Pablo I. Huq  
 Duration: 07/01/1994 - 12/31/1996  
 Amount of support: \$360,000

9. Project title: Wave Processes Near Tidal Inlets  
 Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
 Sponsor's Grant Number: R/OE-13  
 P.I.: James T. Kirby  
 Duration: 02/01/1995 - 01/31/1997  
 Amount of support: \$105,000
  
10. Project title: Using Hydrodynamic Models to Interpret Remote Sensing Images of the Sea Surface  
 Sponsor: Office of Naval Research, Base Enhancement Program  
 Sponsor's Grant Number: N00014-97-1-0283  
 P.I.'s: James T. Kirby and Robert A. Dalrymple  
 Duration: 01/01/1997 - 06/30/2001  
 Amount of support: \$526,581
  
11. Project title: Harbor Response to Wave Breaking on Opposing Ebb Currents  
 Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
 Sponsor's Grant Number: R/OE-21  
 P.I.: James T. Kirby  
 Duration: 02/01/1997 - 01/31/1999  
 Amount of support: \$90,000
  
12. Project title: Hydrodynamics of the Nearshore Zone  
 Sponsor: Office of Naval Research, Coastal Dynamics Program  
 Sponsor's Grant Number: N00014-98-1-0521  
 P.I.'s: Robert A. Dalrymple, James T. Kirby and Ib A. Svendsen  
 Duration: 03/01/1998 - 09/30/1999  
 Amount of support: \$154,319
  
13. Project title: Boussinesq Modelling of Waves in Harbors and Tidal Inlets  
 Sponsor: Army Research Office  
 Sponsor's Grant Number: DAAG55-98-0173  
 P.I.'s: James T. Kirby and Robert A. Dalrymple  
 Duration: 04/15/1998 - 04/14/2001  
 Amount of support: \$165,000
  
14. Project title: Effects of Vertical Current Shear on Spatial Wave Evolution  
 Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
 Sponsor's Grant Number: R/OE-24  
 P.I.: James T. Kirby  
 Duration: 02/01/1999 - 01/31/2001  
 Amount of support: \$67,000
  
15. Project title: Modeling Beach Morphology Changes Coupled to Incident Wave Climate and Low Frequency Currents  
 Sponsor: Office of Naval Research, Coastal Dynamics Program  
 Sponsor's Grant Number: N00014-99-1-0398  
 P.I.'s: James T. Kirby  
 Duration: 03/01/1999 - 06/30/2001  
 Amount of support: \$100,851

16. Project title: Development and Verification of a Comprehensive Community Model for Physical Processes in the Nearshore Ocean  
Sponsor: National Ocean Partners Program (National Science Foundation and Office of Naval Research)  
Sponsor's Grant Number: N00014-99-1-1051  
P.I.s: James T. Kirby, John Allen (Oregon State University), Tom Drake (North Carolina State University), Steve Elgar (Woods Hole Oceanographic Institution), Bob Guza (Scripps Institution of Oceanography), Dan Hanes (University of Florida), Tom Herbers (Naval Postgraduate School), James Kaihatu (Naval Research Laboratory), George Mellor (Princeton University), H. Tuba Özkan-Haller (Oregon State University), Ib A. Svendsen, Ed Thornton (Naval Postgraduate School)  
Duration: 08/01/1999 - 03/31/2005  
Amount of support: \$4,360,192
  
17. Project title: Alongshore Propagating Waves in the Nearshore Region  
Sponsor: Office of Naval Research, Coastal Dynamics Program  
Sponsor's Grant Number: N00014-00-1-0076  
P.I.'s: James T. Kirby  
Duration: 10/01/1999 - 09/30/2000  
Amount of support: \$34,647
  
18. Project title: Surface Wave Propagation on Vertically-Sheared Currents  
Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
Sponsor's Grant Number: R/OE-30  
P.I.: James T. Kirby  
Duration: 02/01/2001 - 01/31/2003  
Amount of support: \$75,000
  
19. Project title: Directional, Dissipative and Random Effects in Wave Forcing of Nearshore Circulation"  
Sponsor: Office of Naval Research, Ocean Modeling Program  
Sponsor's Grant Number:  
P.I.: J. Kaihatu, J. Veeramony and J. T. Kirby  
Duration: 10/01/2002 - 03/31/2005  
Amount of support: \$246,200
  
20. Project title: Coupling Inner Shelf Ocean Model and a Nearshore Community Model for Wave and Current Predictions at Tidal Inlets"  
Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
Sponsor's Grant Number: R/OE-31  
P.I.: James T. Kirby and F. Shi  
Duration: 02/01/2003 - 01/31/2005  
Amount of support: \$175,457
  
21. Project title: Coupled Wind Wave and Acoustic Model to Predict Sea Surface Roughness in Delaware Bay"  
Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
Sponsor's Grant Number: R/OE-32  
P.I.: James T. Kirby, M. Badiey, K. C. Wong  
Duration: 02/01/2003 - 01/31/2005  
Amount of support: \$271,131
  
22. Project title: Parameterization of a Two-Phase Sheet Flow Model and Application to Nearshore Morphology

Sponsor: Office of Naval Research, Coastal Geosciences Program  
Sponsor's Grant Number:  
P.I.'s: J. T. Kirby, T.-J. Hsu, S. Elgar, D. M. Hanes  
Duration: 10/01/2003 - 09/30/2005  
Amount of support: \$71,378

23. Project title: Collaborative Research: CROSSTEX - Experimental Study of Onshore Bar Movement  
Sponsor: National Science Foundation, Physical Oceanography Program  
P.I.s: H. T. Ozkan-Haller, M. C. Haller, J. T. Kirby  
Duration: 06/01/2004 - 12/31/2007  
Amount of support: \$270,637 (Delaware)
24. Project title: Generation and transport of vorticity and effects on mean surfzone currents: wave-averaged and wave-resolving formulations  
Sponsor: Office of Naval Research, Coastal Geosciences Program  
P.I.: J. T. Kirby  
Duration: 10/1/2004 - 9/31/2006  
Amount of support: \$123,577
25. Project title: Real-time surface wave measurement and modeling in Delaware Bay  
Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
Sponsor's Grant Number: R/OE-xx  
P.I.: James T. Kirby, M. Badiey, K. C. Wong  
Duration: 02/01/2003 - 01/31/2005  
Amount of support: \$169,138
26. Project title: Field observations and predictions of rip currents  
Sponsor: Delaware Sea Grant College (U. S. Department of Commerce)  
Sponsor's Grant Number: R/OE-xx  
P.I.: James T. Kirby  
Duration: 02/01/2003 - 01/31/2005  
Amount of support: \$128,104
27. Project title: Parallel computing facilities for ONR-sponsored nearshore and coastal ocean research  
Sponsor: ONR DURIP program  
Sponsor's Grant Number: N00014-05-1-0752  
PI: James T. Kirby, A. D. Kirwan, B. Lipphardt and F. Shi  
Duration: 6/1/2005-4/31/2006  
Amount of support: \$142,639
28. Project title: Enhancement of the NearCoM model for nearshore hydrodynamics  
Sponsor: ONR Coastal Geosciences  
Sponsor's Grant number: N00014-05-1-0423  
PI: J. T. Kirby  
Duration: 5/1/2005-6/30/2006  
Amount of support: \$49,075
29. Project title: Operation and maintenance of a video beach observing system at Sea Colony, Bethany Beach, DE  
Sponsor: State of Delaware Department of Natural Resources (DNREC)  
PI: J. T. Kirby



Duration: 11/01/2005 - 6/30/06  
Amount of support: \$14,825.40

30. Project title: Community sediment transport model  
Sponsor: NOPP, subcontract to WHOI  
P.I.: C. Sherwood, W. R. Geyer, T. R. Keen (Kirby co-PI)  
Duration: 06/01/2006-12/31/2009  
Amount of support: \$150,000 (UD), \$2,700,000 (overall)
31. Project title: Generation, transport and fate of surfzone bubbles  
Sponsor: ONR Coastal Geosciences  
P.I. J. T. Kirby, F. Shi  
Duration: 02/01/07-9/30/09  
Amount of support: \$350,218.
32. Project title: Video-based bathymetric determination for rip current studies  
PIs: James T. Kirby, Chandra Kambhamettu, Jamie MacMahan  
Sponsor: Sea Grant  
Amount: \$140,000  
Duration: 02/01/07-01/31/09
33. Project title: ESMF coupling of meteorology, ocean and nearshore models for use in predicting coastal inundation.  
PIs: Fengyan Shi, James T. Kirby  
Sponsor: Sea Grant  
Amount: \$125,600  
Duration: 02/01/07-01/31/09
34. Project title: Understanding rip current outbreaks and tracking victims in a rip current  
PIs: Jamie MacMahan, Fengyan Shi and James T Kirby  
Sponsor: Sea Grant  
Amount: \$139,900  
Duration: 02/01/07-01/31/09
35. Project title: Effects of oceanographic variability on underwater communications  
PIs: W. Hodgkiss (SIO) et IX alia. (J. T. Kirby and M. Badiey, UD)  
Sponsor: ONR MURI program  
Amount: \$4,500,000 (total, estimate), \$850,000 (UD, estimate)  
Duration: ???/07-???/12
36. Project title: Generation, transport and fate of surfzone bubbles  
PIs: James T. Kirby and Fengyan Shi  
Sponsor: ONR Coastal Geosciences  
Amount: \$390,000  
Duration: 3/1/07-9/30/09
37. Project title: Collaborative Research: Rip current dynamics in a complex beach environment  
PIs: James T. Kirby (UD), Jamie MacMahan, Tim Stantoin, Ed Thornton (NPGS), Ad Reniers (U. Miami)  
Sponsor: NSF Physical Oceanography  
Amount:\$229,214 (UD)  
Duration: 12/1/07-11/30/10
38. Project Title: Validation of a coupled model system for Delaware Bay and adjacent coastal region  
PIs: James T. Kirby  
Sponsor: Sea Grant  
Amount:\$150,144  
Duration: 2/1/09-1/31/11

39. Project Title: CHRP07: Modeling hypoxia and ecological responses to climate and nutrients  
 PIs: W. Kemp (U. MD) et alia (D. DiToro and J. T. Kirby, UD)  
 Sponsor: NOAA Coastal Hypoxia Research Program (CHRP)  
 Amount: \$2,321,845 Duration: 7/1/07-6/30/12
  
40. Project Title: Collaborative research: The dynamics of sediment-laden river plume and initial deposition off small mountainous rivers  
 PI's: T-J Hsu and J. T. Kirby (UD), W. R. Geyer (WHOI)  
 Sponsor: NSF Physical Oceanography  
 Amount:\$450,361 (UD) Duration: 9/1/09-8/31/12
  
41. Project Title: Simulating surf zone bubbles  
 PI's: J. T. Kirby and F. Shi  
 Sponsor: ONR Coastal Geosciences  
 Amount: \$496,628  
 Duration: 10/1/09-9/31/12
  
42. Project Title: Best practices for physical processes and impact assessment in support of dredging operations on the U. S. outer continental shelf  
 PI's: J-T Kirby (UD), J. Ramsey (ACE), S. Misra (Gerwick, Inc.)  
 Sponsor: Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE)  
 Amount: \$490,000 (\$140,000 UD)  
 Duration: 10/1/10-9/30/12
  
43. Project Title: Modeling tsunami inundation and assessing tsunami hazards for the U. S. east coast  
 PI's: J. T. Kirby (UD), S. T. Grilli, (URI)  
 Sponsor: NTHMP (NOAA)  
 Amount:  
 Duration: 9/1/10-8/31/14
  
44. Project Title: A process-based model of long term marsh platform and shoreline evolution in response to rising sea level and subsurface flow  
 PI's: J. T. Kirby and F. Shi  
 Sponsor: Delaware Sea Grant College (NOAA)  
 Amount: \$57,073  
 Duration: 2/1/11-1/31/12
  
45. Project Title: A process-based model of long term marsh platform and shoreline evolution in response to rising sea level and changing sediment supplies  
 PI's: J. T. Kirby and F. Shi  
 Sponsor: Delaware Sea Grant College (NOAA)  
 Amount: \$121,226  
 Duration: 2/1/12-1/31/14
  
46. Project Title: Surfzone bubbles: Model development, testing and extension to chemical/biological processes  
 PI's: J. T. Kirby and F. Shi  
 Sponsor: ONR Littoral Geosciences and Optics  
 Amount: \$322,406  
 Duration: 10/1/12-9/30/15
  
47. Project Title: Interactions of waves, tidal currents and riverine outflow and their effects on sediment transport  
 PI's: T. J. Hsu, F. Shi and J. T. Kirby  
 Sponsor: ONR Littoral Geosciences and Optics  
 Amount: \$322,406  
 Duration: 12/1/12-11/30/14

48. Project Title: Interactions of waves, tidal currents and riverine outflow and their effects on the delivery and resuspension of sediments in the near field  
 PI's: J. T. Kirby, T. J. Hsu, F. Shi (UD) and G. Ma (ODU)  
 Sponsor: NSF Physical Oceanography  
 Amount: \$483,437 (UD)  
 Duration: 9/1/13 - 8/31/17
49. Project Title: Modeling tsunami inundation and assessing tsunami hazards for the U. S. east coast (Phase 2)  
 PI's: J. T. Kirby (UD), S. T. Grilli, (URI)  
 Sponsor: NTHMP (NOAA)  
 Amount:\$144,056  
 Duration: 9/1/13-8/31/15
50. Project Title: Extension of NHWAVE for modeling wave-ice floe interaction  
 PI's: F. Shi, J. T. Kirby  
 Sponsor: Office of Naval Research  
 Amount: \$83,557  
 Duration: 10/1/13-9/30/15
51. Project Title: Extending models of surface hydrodynamics in complex natural and modified tidal marsh environments  
 PI's: J. T. Kirby and F. Shi  
 Sponsor: Delaware Sea Grant College (NOAA)  
 Amount: \$70,000  
 Duration: 2/1/14-1/31/16
52. Project Title: A hydrodynamic modeling system for the Delaware coast environment PI's: T. Kukulka, J. T. Kirby and F. Shi  
 Sponsor: State of Delaware DNREC  
 Amount: \$243,605  
 Duration: 8/1/14-7/30/17
53. Project Title: Modeling tsunami inundation and assessing tsunami hazards for the U. S. east coast (Phase 3)  
 PI's: J. T. Kirby (UD), S. Grilli (URI)  
 Sponsor: NTHMP (NOAA)  
 Amount:\$175,000  
 Duration: 9/1/14 - 8/31/15
54. Project Title: Wave breaking across the inner shelf and nearshore regions  
 PI's: J. T. Kirby, F. Shi  
 Sponsor: NSF Physical Oceanography  
 Amount: \$363,133  
 Duration: 9/1/14 - 8/31/17
55. Project Title: Modeling, validation and accretion data for Bombay Hook NWR  
 PI's: J. T. Kirby, C. Sommerfield, F. Shi  
 Sponsor: National Fish and Wildlife Foundation  
 Sponsors Grant Number:  
 Amount: \$400,000  
 Duration: 10/1/14 - 9/31/16
56. Project Title: Modeling tsunami inundation and assessing tsunami hazards for the U. S. east coast (Phase 4)  
 PI's: J. T. Kirby (UD), S. Grilli (URI)  
 Sponsor: NTHMP (NOAA)  
 Sponsors Grant Number:  
 Amount:\$248,000  
 Duration: 9/1/15 - 8/31/17

57. Project Title: Collaborative Research: Development, experimental validation and case studies for the next generation of landslide tsunami models for coastal hazard mitigation  
 PI's: S. T. Grilli (URI), J. T. Kirby (UD), G. Ma (ODU)  
 Sponsor: NSF CMMI- Engineering for Natural Hazards (ENH)  
 Sponsors Grant Number:  
 Amount: \$244,995 (UD portion)  
 Duration: 9/1/15 - 8/31/18
58. Project Title: Frontal structures in the Columbia River plume nearfield - a non-hydrostatic coastal modeling study  
 PI's: T. J. Hsu, F. Shi and J. T. Kirby  
 Sponsor: ONR Littoral Geosciences and Optics  
 Sponsors Grant Number:  
 Amount: \$322,406  
 Duration: 10/1/15 - 9/30/17
59. Project Title: Coupling geomorphological and ecological processes in numerical simulations of Delaware salt marsh evolution  
 PI's: J. T. Kirby and F. Shi  
 Sponsor: Delaware Sea Grant College (NOAA)  
 Sponsors Grant Number:  
 Amount: \$135,636  
 Duration: 2/1/16-1/31/18
60. Project Title: U. S. East Coast: Maritime assessments and improvements to source and inundation modeling procedures  
 PI's: J. T. Kirby (UD), S. Grilli (URI)  
 Sponsor: NTHMP (NOAA National Weather Service)  
 Sponsors Grant Number: NA16NWS4670034  
 Amount:\$236,658  
 Duration: 9/1/16 - 8/31/18
61. Project Title: Development and validation of ship-wake generation in FUNWAVE-TVD for predicting ship-wake effects on adjacent shorelines  
 PI's: F. Shi and J. T. Kirby  
 Sponsor: US Army Corps of Engineers  
 Amount: \$144,953  
 Duration: 9/27/16 - 9/26/17
62. Project Title: Ship-wake modeling  
 PI's: F. Shi and J. T. Kirby  
 Sponsor: US Army Corps of Engineers  
 Sponsor's Grant Number: W912HZ17P0129  
 Amount: \$147,866  
 Duration: 7/30/17 - 7/30/18
63. Project Title: Frontal structures and surface signatures revealed by non-hydrostatic eddy resolving numerical simulations  
 PI's: T. J. Hsu, F. Shi and J. T. Kirby  
 Sponsor: Office of Naval Research  
 Sponsor's Grant Number: N00014-17-1-2796  
 Amount: \$332,525  
 Duration: 8/01/17 - 7/31/20
64. Project Title: U. S. East Coast: Maritime assessments and improvements to source and inundation modeling procedures  
 PI's: J. T. Kirby (UD), S. Grilli (URI)

Sponsor: NTHMP (NOAA National Weather Service)  
Sponsors Grant Number: NA17NWS4670010  
Amount:\$120,290  
Duration: 9/1/17 - 8/31/19

65. Project Title: Implementing a subgrid scheme for improving marsh inundation estimates in the community model FVCOM  
PI's: J. T. Kirby, F. Y. Shi  
Sponsor: Delaware Sea Grant College (NOAA)  
Sponsors Grant Number:  
Amount:\$115,390  
Duration: 2/1/18 - 1/31/20
66. Project Title: Collaborative Research: Ocean Wave Dissipation through Breaking and Bubble Generation  
PI: J. T. Kirby  
Sponsor: National Science Foundation, Physical Oceanography Program  
Sponsor's Grant Number: OCE-1756355  
Amount: \$145,500  
Duration: 3/1/18 - 2/28/21

## **EDUCATIONAL ACTIVITIES**

### **Graduate Degrees Supervised**

#### University of Florida

1. Padmaraj Vengayil, Master of Science, 1986. "Shoaling and reflection of nonlinear shallow water waves".
2. Haruhiko Kaku, Master of Science, 1987. "A parabolic equation method in polar coordinates for waves in harbors".
3. Renji Philip, Master of Science, 1988. "Numerical simulation of shallow water waves".
4. Jeffrey P. Anton, Master of Science, 1989. "Resonant and non-resonant reflection of linear waves over rapidly varying bottom undulations".
5. Thomas R. McSherry, Master of Science, 1989. "Wave-current interaction over a submerged bar field."

#### University of Delaware

1. Christina A. Rasmussen, Master of Civil Engineering, 1992. "Transient numerical modeling of the mild-slope equation".
2. H. Tuba Özkan-Haller, Master of Civil Engineering, 1993. "Evolution of breaking directional spectral waves in the nearshore zone".
3. Glenn D. Bowen, Master of Civil Engineering, 1994. "Shoaling and breaking random waves on a 1:35 laboratory beach".
4. Changhoon Lee, Ph.D. Civil Engineering, 1994. "A study of time-dependent mild-slope equations".
5. James M. Kaihatu, Ph.D. Civil Engineering, 1994. "Frequency domain models for nonlinear finite depth water wave propagation".
6. Arun Chawla, Master of Civil Engineering, 1995. "Wave transformation over a submerged shoal".
7. John Bakunin, Master of Civil Engineering, 1995. "Experimental study of hydraulic jumps in low Froude number range".
8. Ge Wei, Ph.D. Civil Engineering, 1997. "Simulation of water waves by Boussinesq models".

9. H. Tuba Özkan-Haller, Ph.D. Civil Engineering, 1997. “Nonlinear evolution of shear instabilities of the longshore current”.
10. Mauricio F. Gobbi, Ph.D. Civil Engineering, 1998. “A new Boussinesq-type model for surface water wave propagation”.
11. Arun Chawla, Ph.D. Civil Engineering, 1999. “An experimental study on the dynamics of wave blocking and breaking on opposing currents”.
12. Shubhra Misra, Master of Civil Engineering, 1999. “Determining water depths from surface images using Boussinesq equations”.
13. Lisa Hommel, Master of Civil Engineering, 2000. “Vortex formation resulting from solitary wave interaction with a breakwater”.
14. Ozgur Gungordu, Master of Civil Engineering, 2001. “Evolution of coupled hydrodynamic and bed instabilities”.
15. Furong Zhen, Master of Civil Engineering, 2004. “On the numerical properties of staggered vs. non-staggered grid schemes for a Boussinesq equation model”.
16. Shubhra Misra, Ph.D. Civil Engineering, 2005. “The turbulent dynamics of quasi-steady spilling breakers - Theory and experiment”.
17. Wenting Qin, Master of Civil Engineering, 2005. “Application of the spectral wave model SWAN in Delaware Bay” (co-advised with Mohsen Badiy, CMS)
18. Wen Long, Ph. D. Civil Engineering, 2006. “Boussinesq modeling of waves, currents and sediment transport”.
19. Long Xu, Master of Civil Engineering, 2006, “Numerical study in Delaware Inland Bays” (co-advised with Dom DiToro, CEE).
20. Todd DeMunda, Master of Civil Engineering, 2006, “A system for video observation of nearshore processes”.
21. Pablo Teran, Master of Civil Engineering, 2007. “Model simulations of bar evolution on a large scale laboratory beach”
22. Allison Bridges, Master of Civil Engineering, 2008. “The effect of model seagrass on wave runup. A laboratory investigation”
23. Joseph Geiman, Master of Ocean Engineering, 2008. “Vorticity dynamics in the presence of shallow water waves”
24. Rob Hampson, Master of Civil Engineering, 2008. “Video-based nearshore depth inversion using WDM method”.
25. Jeff Brown, Master of Civil Engineering, 2008. (Joint with J. H. MacMahan), “Lagrangian field observations of rip currents”
26. Cihan Bayandir, Master of Civil Engineering, 2009, (Joint with M. Badiy), “Impact of linear and nonlinear surface gravity waves on high frequency acoustic propagation”
27. Jennifer Brown, Master of Civil Engineering, 2009, (joint with J. H. MacMahan), “Field measurements and modeling of surfzone currents on inhomogeneous beaches”.
28. Yunfeng Chen, Master of Civil Engineering, 2010, (Joint with F. Shi), “Coupling of wave and circulation models for predicting storm-induced waves, surges, and coastal inundation”.
29. Phil Castellano, Master of Civil Engineering, 2011, “Validation of a hydrodynamic model of Delaware Bay and the adjacent coastal region”.

30. Joseph Geiman, Ph.D. Ocean Engineering, 2011, "Forced vortex dynamics in the surf zone".
31. Gangfeng Ma, Ph.D. Civil Engineering, 2012, "Multiscale numerical study of turbulent flow and bubble entrainment in the surf zone".
32. Nuttita Pophet, Master of Ocean Engineering, 2012, "Parallel implementation of a three-dimensional non-linear wave model for random directional seas".
33. Morteza Derakhti, Master of Civil Engineering, 2013, "Bubble entrainment and liquid-bubble interaction under unsteady breaking waves".
34. Ryan Mieras, Master of Civil Engineering, 2014, "A high-resolution numerical model investigation into the response of a channelized salt marsh to a storm surge event".
35. Morteza Derakhti, Ph. D. Civil Engineering, 2016, "LES and  $\sigma$ -coordinate RANS simulations of laboratory surface wave breaking".
36. Babak Tehranirad, Ph. D. Civil Engineering, 2016, "Does morphological adjustment during tsunami inundation increase levels of hazard?".
37. Zhifei Dong, Ph. D. Ocean Engineering, 2016, "Wave-current interaction in strongly sheared mean flows".
38. Saedeh Banihashemi, Ph. D. expected 2018.
39. India Woodruff, MCE, expected 2018.
40. Cheng Zhang, Ph. D., expected 2019.
41. Mithun Deb, Ph. D., expected 2019.

#### **Supervision of Postdoctoral Scholars**

Listed with co-advisors (if any) and present affiliations

1. Francis C. K. Ting, 1989 - 1991, South Dakota State University
2. Qin J. Chen, 1997 - 2000, (with Tony Dalrymple), Louisiana State University
3. Andrew B. Kennedy, 1997 - 2001, (with Tony Dalrymple), Notre Dame University
4. Ali Abdolali, 2015 - 2017, National Weather Service
5. Morteza Derakhti, 2016 - 2017, Johns Hopkins University

#### **Courses Taught at University of Delaware**

1. CIEG 125, "Introduction to Civil Engineering". Occasional guest lectures and laboratory tours.
2. MECH 305/CIEG 305, "Fluid Mechanics"
3. MECH 306/CIEG 306, "Fluid Mechanics Laboratory"
4. CIEG 639, "Hydromechanics" (now "Ocean Fluid Dynamics"). Existing course, providing first semester graduate students with an introduction to the differential equation approach to fluid mechanics.
5. CIEG 672, "Water Wave Mechanics". Existing course, providing first semester graduate students an introduction to the linear theory of surface water waves.
6. CIEG 681, "Water Wave Spectra". Existing course providing an introduction to spectral time series analysis in the context of ocean waves and other marine phenomena.
7. CIEG 682. "Nearshore Processes". Existing course. Introduction to physical basis for wave-current interaction and wave-driven surfzone processes.

8. CIEG 684, "Numerical Methods in Coastal Modeling". New course. Introduction to numerical methods for partial differential equations, with applications to parabolic, hyperbolic and elliptic model equation systems appearing in coastal engineering applications.
9. CIEG 693/MAST 693, "Waves in the Marine Environment". New course developed in conjunction with Mohsen Badiey, CMS. Course provides a broad based introduction to wave processes in the marine environment, including water gravity waves, acoustic waves, seismic waves and electromagnetic waves. Course is required for graduate students in the CEOE POSE program.
10. CIEG 872, "Advanced Water Wave Mechanics". Existing course providing an introduction to the nonlinear theories of surface water waves.

A textbook, "Waves in the Nearshore and Coastal Ocean", covering the content of CIEG672, CIEG 682 and CIEG 872, is in preparation for publication by *World Scientific*.



## **Recent Consulting Activities**

1. Mactec, Inc., 2009, 2011.  
Tsunami simulations as part of flood analysis for an NRC licensing effort for a proposed expansion for an East Coast nuclear power plant.
2. Sargent & Lundy, 2011.  
Tsunami simulations as part of flood analysis for an NRC licensing effort for a proposed Gulf Coast nuclear power plant.
3. Bechtel, Inc., 2012-2013.  
Tsunami simulations as part of flood analysis for an NRC licensing effort for expansion of an East Coast nuclear power plant.
4. CH2M-Hill, Inc., 2012-2013.  
Tsunami simulations as part of flooding reanalysis for an existing West Coast nuclear power plant.
5. AMEC, Inc., 2013-2014.  
Tsunami hazard assessment as part of flooding reanalysis for East Coast nuclear power plant.
6. Water Institute of the Gulf, 2013.  
Evaluation of storm surge protection system for New Orleans, LA.
7. Chevron, 2014-2015.  
Landslide tsunami hazard analysis.
8. State of Alaska, 2014.  
Simulations of wave activity and harbor resonance in a small fishing harbor.

## **Recent Short Courses and Workshop Supervision**

1. Coastal modeling, *30th Intl. Conf. Coastal Engineering*, San Diego, September 2, 2006.
2. Modeling shallow water waves, *CEAMA, Univ. of Granada*, May 2012.
3. Benchmark testing of landslide tsunami generation models, Galveston, TX, Jan. 9-11, 2017 (NTHMP)
4. FUNWAVE Workshop, University of Delaware, July 25-27, 2017 (Supported by USACE ERDC Coastal Hydrodynamics Lab).