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Department of Civil and Environmental Engineering
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Education

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| 1979-1983 | Stanford University, Stanford, California.
Ph.D. Civil Engineering, Water Resources Engineering
Minor in Mechanical Engineering |
| 1977-1978 | Stanford University, Stanford, California.
M.S. Civil Engineering, Water Resources Engineering |
| 1973-1976 | University of the Witwatersrand, Johannesburg, South Africa.
B.Sc. Civil Engineering |

Professional Experience

At Stanford University

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| 2021-present. | Professor, Department of Oceans, School of Sustainability |
| 2021-present | Co-Director, Program on Sustainability Science and Practice |
| 2018 - present | Faculty Athletic Representative to the NCAA |
| 2006 – present | The William Alden Campbell and Martha Campbell Professor of Engineering |
| 2005 - 2014 | The Michael Forman University Fellow in Undergraduate Education |
| 2004 – 2016 | Perry L. McCarty Director, Woods Institute for the Environment |
| 1999- 2002 | Senior Associate Dean of Engineering, School of Engineering |
| 1996- present | Professor, Department of Civil and Environmental Engineering |
| 1995-1999 | Chair, Department of Civil and Environmental Engineering |
| 1994-1995 | Associate Chair, Department of Civil Engineering |
| 1991-1996 | Associate Professor, Department of Civil Engineering |
| 1991-1996 | Director, Environmental Fluid Mechanics Laboratory,
Department of Civil Engineering |
| 1985-1991 | Associate Director, Environmental Fluid Mechanics Laboratory,
Department of Civil Engineering |
| 1984-1991 | Assistant Professor, Department of Civil Engineering |
| 1983-1984 | Acting Assistant Professor, Department of Civil Engineering |

- 1979-1983 Research Assistant, Hydromechanics Laboratory,
Department of Civil Engineering
Conducted research on the characteristics of the flow in a lid-driven cavity with and without variable-density effects. Also conducted a comparative study of the laser-Doppler anemometer.
- 1979-1980 Laboratory Instructor, Department of Civil Engineering
Lectured and supervised laboratory section of an undergraduate course in fluid mechanics (Eng 21). Served on committee to re-organize and revise laboratory course material.
- 1978-1979 Teaching Assistant, Department of Civil Engineering
Assisted in graduate and undergraduate courses in hydrology, hydraulics, and sedimentation engineering.

Non-Stanford

- 7/78-10/78 Engineer, Watermeyer, Legge, Piesold and Uhlmann,
1977 Johannesburg, South Africa
Implemented finite-element analysis of cooling tower structures. Performed hydraulic design and layout of water reticulation systems for chemical and power plants.
- 11/75-2/76 Student Engineer, Watermeyer, Legge, Piesold and Uhlmann,
Johannesburg, South Africa.
Finite-element analysis of cooling tower structures.

Awards and Honors/Professional Affiliations

Honors and Awards

- Robert T. Knapp Award given by the Fluids Engineering Division of the American Society of Mechanical Engineers, 1985
- American Society of Civil Engineers Award for Outstanding Service, 1986-87
- Stanford University School of Engineering Tau Beta Pi Award for Excellence in Undergraduate Teaching, 1989
- Leavell Family Faculty Scholar, Stanford University School of Engineering, 1989-92
- Gledden Visiting Senior Fellow, University of Western Australia, 1991
- ASSU Outstanding Teaching Award, 1991-92
- Lillian and Thomas B. Rhodes Award for Excellence in Undergraduate Teaching, 1993
- University Fellow, Stanford University, 1994-1996
- Bing Teaching Fellowship, Stanford University, 1995-1998
- Eugene L. Grant Award for Excellence in Undergraduate Teaching, 1995
- Associated Students of Stanford University, Teacher of the Year – Honorable Mention, 2007
- Eugene L. Grant Award for Excellence in Undergraduate Teaching, 2011
- Fellow of the American Physical Society, 2015
- Richard W. Lyman Award, Stanford University, 2015
- Sustainable Stanford Awardee, Stanford University, 2017
- Borland Lecturer in Hydraulics, Colorado State University, 2018.
- Stanford University School of Engineering Tau Beta Pi Award for Excellence in Undergraduate Teaching, 2019.
- Elected Fellow of California Academy of Sciences, 2020.

Society Memberships

American Society of Civil Engineers
American Society of Mechanical Engineers
American Geophysical Union
American Physical Society

External Service & Scholarly Activities

1994 - 2005	Member, ASCE Technical Committee on Hydraulic Measurements and Experimentation
1992 - 2008	Member, ASCE Technical Committee on Turbulence
1990 - 1994	Member, ASCE Technical Subcommittee for developing an Album of Transport Processes
1992 - 1995	Member, ASCE Technical Committee for developing a Research Advocacy for Hydraulics and Hydrology
1989 - 1992	Member, Technical Advisory Committee to the San Francisco Estuary Project

Reviewerships

- Journal of Fluids Engineering, ASME
- Journal of Hydraulic Engineering, ASCE
- National Science Foundation - Fluid Mechanics
 - Physical Oceanography
 - Biological Oceanography
 - Instrumentation Development
- Journal of Fluid Mechanics
- Environmental Fluid Mechanics
- International Journal of Heat and Fluid Flow
- Experiments in Fluids
- Physics of Fluids
- Journal of Atmospheric and Oceanic Technology
- Journal of Computational Physics
- International Journal for Numerical Methods in Fluids
- Journal of Geophysical Research
- Physical Review Fluids
- Geophysical Research Letters
- Physics Review Fluids
- Science
- Proceedings of National Academy of Sciences

Research Experience and Interests

- Upwelling in coastal systems
- Transport and mixing processes in estuarine and near-coastal systems
- The nature of turbulence in stratified environments
- Numerical techniques for simulating estuarine and geophysical flows
- The hydrodynamics of benthic grazing by bivalve feeders
- The effects of coherent structures on mixing in the upper layers of large waterbodies

- The hydrodynamics of chemical sensing in marine environments
- Mass and momentum transfer in coral-reef and kelp-forest systems
- Transport of microplastics in marine environments
- Dispersion of brine gravity currents in coastal environments
- Identification of surface coherence in turbulent flows
- Transport of Firebrand Embers over Natural Canopies

Teaching

Introduction to Fluid Mechanics; Water Resources Engineering; Environmental Fluid Mechanics; Open Channel Flow; Numerical Methods; Transport and Mixing Processes in Surface Water Flows; Modeling Environmental Flows; Rivers Streams and Canals; Topics in Stratified Turbulence; A Transition to Sustainability; Hydrodynamics.

Service and Contributions

Major Service in Civil and Environmental Engineering and School of Engineering at Stanford

- Associate Director, Environmental Fluid Mechanics Laboratory, 1985-1991
- Director, Environmental Fluid Mechanics Laboratory, 1991-1996
- Chair, Department of Civil and Environmental Engineering, 1995-1999
- Senior Associate Dean of Engineering for Faculty Affairs, 1999-2002
- Member of committee designing and creating the Environmental Systems Engineering degree.

Major University Service at Stanford University

- Currently serves as the Co-Chair of the Subcommittee on Antisemitism and Anti-Israeli Bias at Stanford.
- Currently serves as the Faculty Athletic Representative to the Pac-12 and NCAA
 - Chaired various committees for Provost on athletics policy regarding housing during Covid Pandemic, health and wellbeing, and athletic performance.
 - Chaired the Pac-12 Council in 2020-21.
 - Chair, Committee on Athletics, Physical Education and Recreation
- Numerous terms as elected member of the Faculty Senate totaling over 20 years of service
 - Chair of Committee on Committees
 - Member of the Senate Executive Committee during 3 terms
- Member of the University Advisory Board
 - Elected multiple time and served a total of more than 10 years
 - Served as both Chair and Vice-Chair of the Board at various times
- Member of the University Committee to develop long-term solution for Searsville Dam and Reservoir for the past 10 years
 - Helped formulate the solution currently being implemented and advised on the supporting engineering studies
- Member of the 4-member faculty panel for the design and construction of the Yang and Yamazaki Environment and Energy Building (Y2E2)
 - Spent four years working with architects, planners, engineers and campus community designing and programming the award-winning building.
 - Oversaw the preparation and submission of the materials for the successful application to U.S. Green Building Council to have the building certified as LEED Platinum.
 - Member and Chair of the Building Leadership Team for Y2E2 responsible for developing policy for the administration of the building.

- Member of the Provost's Sustainability Working Group to coordinate sustainability policy and practices for Stanford University
- Together with Buzz Thompson and Pam Matson served as the leaders for the Initiative on the Environment, Energy and Sustainability which helped coordinate all programs and fundraising on the Environment, Energy, and Sustainability during the fundraising campaign between 2003 and 2010 led by President John Hennessy.

Institution Building at Stanford University

- Member of the Committee designing the Earth Systems Program chaired by Gary Ernst and Joan (John) Roughgarden
 - designed the Environmental Science and Technology track
 - served on Committee of the Whole for multiple terms
- Member of the Steering Committee of the Goldman Interdepartmental Honors Program
- Member of the Committee designing the Emmett Interdisciplinary Program on Environment and Resources
 - Served on the executive committee for 6 years
- Member of the Bio-X IIP Committee
 - Helped formulate and design the seed funding program
 - Served on selection committee for first 3 years of the program
- Global Climate and Energy Program
 - Co-wrote the proposal to ExxonMobil with Lynn Orr for the creation of the program
 - Served on executive committee for a number of years
- Precourt Institute for Energy Efficiency
 - Co-wrote the proposal for the creation of the Institute with Jim Sweeney
 - Served on Advisory Council for a number of years
- Stanford Woods Institute for the Environment - The Institute (<https://woods.stanford.edu/>) currently has a core faculty group of 60 jointly appointed Fellows, more than 150 faculty affiliates, and a budget of \$25 million, focusing its efforts on freshwater, the oceans, natural capital, food security, human health, sustainable development, and climate solutions.
 - Chaired committee formulating the institute concept
 - Co-wrote the business plan (with Buzz Thompson) for the funding of the Institute
 - Directed (together with Buzz Thompson) the Institute from its founding in 2003 until 2016.
 - Co-led (with Buzz Thompson) the development of the \$30M proposal for the formulation of the Center for Ocean Solutions as a partnership with the Monterey Bay Aquarium and the Monterey Bay Aquarium Research Institute
 - Co-led the successful integration of the Center for Environmental Science and Policy from the Freeman-Spogli Institute (FSI) into the Woods Institute, and the joint management of the Food Security and Environment Program with FSI.
 - During the period of Koseff's directorship the Woods Institute successfully launched the following programs:
 - Natural Capital Program
 - Environmental Ventures Program
 - Realizing Environmental Innovations Program
 - Realizing Environmental Leadership Program
 - The Program on Water, Health and Development
 - Water in the West (joint with the Lane Center)
 - Global Freshwater Initiative
- Sustainability Science and Practice Program

- Member of faculty team developing the program
- Currently Faculty Co-Director (with Julia Novy)
- Stanford Doerr School for Sustainability
 - Served on three committees over the period (Nov 2019 to Aug 2021) charged with forming the plans, structure and functioning of the School.
 - Served on planning committee for the Oceans Department
 - Member of the Space Committee for the Department
 - Member of the Fundraising Committee for the Department

Major Outside Professional Academic Service

- Served on the Visiting Committees to the following:
 - Civil and Environmental Engineering – San Jose State University
 - Civil and Environmental Engineering – Carnegie-Mellon University (Chair)
 - Civil and Environmental Engineering – Cornell University
 - Civil Engineering – The Technion: Israel Institute of Technology (Chair)
 - College of Engineering – University of Michigan
 - Iowa Institute of Hydraulic Research – University of Iowa
 - MIT-Woods Hole Joint Program in Oceanography
 - Institute on the Environment – University of Minnesota
 - St. Anthony Falls Hydraulics Laboratory – University of Minnesota

Other Academic and Community Service

- Trustee, The California Academy of Science (2018 to present)
- Member, Advisory Board of Resilient by Design (2017 to 2019)
- Member of the Board of Governors of the Israel Institute of Technology (2007-2010)
- Member of the Advisory Board of Climate Central (2007-2010)
- Member, Palo Alto/Stanford Green Ribbon Task Force on Climate Change (2007-2009)

Current and Former Students

Former Ph.D. Students – As Principal Advisor

Craig, Anna	Apple
Crimaldi, John	University of Colorado
Chung, Hayoon	Stanford University (postdoc)
Dunckley, Jamie	EPRI
Gross, Edward	Private Consulting, Berkeley, CA
Holt, Stephen	Private Consulting, Boise Idaho
Hult, Erin	Facebook
Lowe, Ryan	University of Western Australia
Lucas, Lisa	USGS
Mandel, Tracy	University of New Hampshire
May, Kris	Pathways Climate Institute
McDonald, Ellen	Plummer Associates
Prasad, Ajay	University of Delaware
Rehmann, Chris	Iowa State University
Reidenbach, Matthew	University of Virginia
Rosenzweig, Itay	Facebook
Rosman, Johanna	University of North Carolina
Shih, Lucinda	Contra Costa Water District
Sunberg, Laura Clark	University of Colorado (postdoc)
Tanimoto, Yuki	McKinsey Consulting

Thompson, Janet K	USGS
Troy, Cary	Purdue University
Weitzman, Joel	Boston Consulting Group
Wiley, Megan	Hydrologics, Maryland
Paul Yi	HMEI, Princeton
Zarama, Francisco	Grainger, Minneapolis
Zeller, Robbie	Faire, San Francisco

Former Ph.D. Students – As Co-Advisor

Briggs, David	City of San Francisco Public Utilities	- with Joel Ferziger
diBenedetto, Michelle	University of Washington	- with Nick Ouellette
Gakhar, Saksham	Meta	- with Nick Ouellette
Garg, Rajat	Synopsys Inc	- with Joel Ferziger
Lin, Ching-Long	University of Iowa	- with Joel Ferziger
O'Riordan, Cathy	ESA, Washington DC	- with Stephen Monismith
Rhee, Hyop	ITEC, Saratoga	- with Bob Street
Zang, Yan	EZ Inspections, San Jose.	- with Bob Street

Current Ph.D. Students – As Principal Advisor

Hamilton, Jenny	Stanford University	- with Stephen Monismith (co-adv)
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Former Engineer Degree Students – As Principal Advisor

Lee, Sueann	AECOM, Hong Kong
McDonald, Cameron.	Morphum Environmental, New Zealand
Mitchell, Abigail	Mott McDonald Seattle
Moore, Christina	US Army Corps of Engineers, Vicksburg

Post-Doctoral Fellows – as Principal Advisor

Hayoon Chung	Stanford University
Schladow, Geoffrey	University of California, Davis
Piccirillo, Paul	SRI International

Papers in Refereed Journals

- Sunberg, L.K.C., DiBenedetto, M.H., Ouellette, N.T., and Koseff, J.R., "Parametric Study of the Dispersion of Inertial Non-Spherical Particles in a Wave-Current Flow," *Physical Review Fluids*, Vol. 9, Issue 3, <https://doi.org/10.1103/PhysRevFluids.9.034302>, 2024.
- Yi, Y.R., and Koseff, J.R., "Underlying physics of mixing efficiency for shear-forced, stratified turbulence," *Physical Review Fluids*, 8, 084803, <https://doi.org/10.1103/PhysRevFluids.8.084803>, 2023.
- Chung, H. and Koseff, J.R., "The interaction of a buoyant plume with a turbulent canopy mixing layer," *Physical Review Fluids*, 8, 064501, <https://doi.org/10.1103/PhysRevFluids.8.064501>, (Editors Suggestion, Featured in Physics), 2023.
- Clark, L.K., DiBenedetto, M.H., Ouellette, N.T., and Koseff, J.R., "Dispersion of Finite-Size, Non-Spherical Particles by Waves and Currents" *Journal of Fluid Mechanics*, 954, <https://doi.org/10.1017/jfm.2022.968>, 2022.
- Yi, Y.R., and Koseff, J.R., "Revised mixing coefficient scaling for sheared stably-stratified turbulence," *Journal of Fluid Mechanics*, 952, A18, <https://doi.org/10.1017/jfm.2022.904>, 2022.
- Gakhar, S., Koseff, J.R., and Ouellette, N.T., "Extracting free-surface expressions of underwater features," *Experiments in Fluids*, 63:138, <https://doi.org/10.1007/s00348-022-03491-w>, 2022.
- Yi, Y.R., and Koseff, J.R., "Dynamics and energetics underlying mixing efficiency in homogeneous stably stratified turbulence," *Physical Review Fluids*, 7(8), <https://doi.org/10.1103/PhysRevFluids.7.084801>, 2022.
- Tanimoto, Y., Ouellette, N.T., and Koseff, J.R., "On the interaction between oncoming internal waves and a dense gravity current in a two-layer stratification," *Journal of Fluid Mechanics*, 932, A28, <https://doi.org/10.1017/jfm.2021.1006>, 2022.
- Chung, H., and Koseff, J.R., "Turbulent structure and scales in canopy-wake reattachment", *Physical Review Fluids*, 6, <https://doi.org/10.1103/PhysRevFluids.6.114605>, 2021
- Tanimoto, Y., Ouellette, N.T., and Koseff, J.R., "Secondary generation of breaking internal waves in confined basins by gravity currents," *Journal of Fluid Mechanics*, 917, A49, <https://doi.org/10.1017/jfm.2021.309>, 2021.
- Chung, H., Mandel, T.L., Zarama, F.J., and Koseff, J.R., "Local and nonlocal impacts of gaps on submerged canopy flow," *Water Resources Research*, 57, 2, <https://doi.org/10.1029/2019WR026915>, February 2021.
- Clark, L.K., DiBenedetto, M.H., Ouellette, N.T., and Koseff, J.R., "Settling of inertial nonspherical particles in wavy flow," *Physical Review Fluids*, 5, <https://doi.org/10.1103/PhysRevFluids.5.124301>, 2020.
- Gakhar, S., Koseff, J.R., and Ouellette, N.T., "On the surface expression of bottom features in free-surface flow," *Journal of Fluid Mechanics*, 900, A41, <https://doi.org/10.1017/jfm.2020.548>, 2020.
- Tanimoto, Y., Ouellette, N.T., and Koseff, J.R., "Interaction between an inclined gravity current and a pycnocline in two-layer stratification," *Journal of Fluid Mechanics*, 887, A8, <https://doi.org/10.1017/jfm.2020.9>, 2020.

- Andruszkiewicz, E.A., Koseff, J.R., Fringer, O.B., Ouellette, N.T., Lowe, A.B., Edwards, C.A., and Boehm, A.B., "Modeling Environmental DNA Transport in the Coastal Ocean using Lagrangian Particle Tracking," *Frontiers in Marine Science*, August 7, <https://doi.org/10.3389/fmars.2019.00477>, 2019.
- Ouillon, R., Meiburg, E., Ouellette, N.T., and Koseff, J.R., "Interaction of a downslope gravity current with an internal wave," *Journal of Fluid Mechanics*, 873, pp. 889-913, <https://doi.org/10.1017/jfm.2019.414>, 2019.
- DiBenedetto, M.H., Koseff, J.R., and Ouellette, N.T., "Orientation dynamics of nonspherical particles under surface gravity waves" *Physical Review Fluids*, 4(3), DOI: <https://doi.org/10.1103/PhysRevFluids.4.034301>, 2019.
- Mandel, T.L., Gakhar, S., Chung, H., Rosenzweig, I., and Koseff, J.R., "On the surface expression of a canopy-generated shear instability," *Journal of Fluid Mechanics*, 867, pp. 633-660, <https://doi.org/10.1017/jfm.2019.170>, 2019.
- Monismith, S.G., Koseff, J.R., and White, B.L., "Mixing Efficiency in the Presence of Stratification: When is it constant?", *Geophysical Research Letters*, Volume 45, Issue 11, doi:10.1029/2018GL077229, 2018.
- Chou, Y-J., Nelson, K.S., Holleman, R.C., Fringer, O.B., Stacey, M.T., Lacy, J.R., Monismith, S.G., and Koseff, J.R., "Three-Dimensional Modeling of Fine Sediment Transport by Waves and Currents in a Shallow Estuary," *Journal of Geophysical Research, Oceans*, doi:10.1029/2017JC013064, 2018.
- Houghton, I. A., Koseff, J.R., Monismith, S.G., and Dabiri, J.O., "Vertically migrating swimmers generate aggregation-scale eddies in a stratified column," *Nature*, doi:10.1038/s41586-018-0044-z, 2018.
- DiBenedetto, M.H., Ouellette, N.T., and Koseff, J.R., "Transport of anisotropic particles under waves," *Journal of Fluid Mechanics*, 837, pp. 320-340, doi:10.1017/jfm.2017.853, 2018.
- Hogg, C.A.R., Egan, G.C., Ouellette, N.T., and Koseff, J.R., "Shoaling internal waves may reduce gravity current transport," *Environmental Fluid Mechanics*, Volume 18, Issue 2, <https://doi.org/10.1007/s10652-017-9554-8>, pp. 383-94, 2018.
- Arthur, R.S., Venayagamoorthy, S.K., Koseff, J.R., and Fringer, O.B., "How we compute N matters to estimates of mixing in stratified flows," *Journal of Fluid Mechanics*, 831, R2, doi:10.1017/jf.2017.679, 2017.
- Mandel, T.L., Rosenzweig, I., Chung, H., Ouellette, N.T., and Koseff, J.R., "Characterizing free-surface expressions of flow instabilities by tracking submerged features," *Experiments in Fluids*, 58: 153. <https://doi.org/10.1007/s00348-017-2435-6>, 2017.
- Arthur, R.S., Koseff, J.R., and Fringer, O.B., "Local versus volume-integrated turbulence and mixing in breaking internal waves on slopes," *Journal of Fluid Mechanics*, 815, pp. 169-198, 2017.
- Craig, A.E., Dabiri, J.O., and Koseff, J.R., "Low order physical models of vertical axis wind turbines" *Renewal and Sustainable Energy*, doi: 10.1063/1.4976983, Feb. 28, 2017.
- Craig, A.E., Dabiri, J.O., and Koseff, J.R., "Flow kinematics in variable-height rotating cylinder arrays," *Journal of Fluids Engineering*, 138(11), 111203, Paper FE-16-1062; doi:10.1115/1.4033676, 2016.

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- Lucas, L.V., Cloern, J.E., Thompson, J.K., Stacey, M.T., and Koseff, J.R., "Bivalve grazing can shape phytoplankton communities," *Frontiers in Marine Science*, <http://dx.doi.org/10.3389/fmars.2016.00014>, 2016.
- Moore, C.D., Koseff, J.R., and Hult, E.L., "Characteristics of bolus formation and propagation from breaking internal waves on shelf slopes," *Journal of Fluid Mechanics*, Vol 791, pp. 260-283, doi: 10.1017/jfm.2016.58, 2016.
- Craig, A.E., Dabiri, J.O., and Koseff, J.R., "A kinematic description of the flow characteristics in an array of finite-height rotating cylinders," *Journal of Fluids Engineering*, 138(7), 070906, Paper FE-15-1630; doi:10.1115/1.4032600, 2016.
- Mungal, M.G., and Koseff, J.R., "Introduction: 32nd Annual Gallery of Fluid Motion (San Francisco, California, USA, 2014)," *Physics of Fluids*, 27, 091101, <http://dx.doi.org/10.1063/1.4930849>, 2015.
- Chou, Y-J., Hollerman, R.C., Fringer, O.B., Stacey, M.T., Monismith, S.G., and Koseff, J.R., "Three-dimensional wave-coupled hydrodynamics modeling in South San Francisco Bay", *Computers & Geosciences*, 85, pp10–21, doi.org/10.1016/j.cageo.2015.08.010, 2015.
- Weitzman, J.S., Zeller, R.B., Thomas, F.I.M., and Koseff, J.R., "The attenuation of current- and wave-driven flow with submerged multispecific vegetative canopies," *Limnology and Oceanography*, doi: 10.1002/lno.10121, 2015.
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- Weitzman, J.S., Samuel, L.C., Craig, A.E., Zeller, R.B., Monismith, S.G., and Koseff, J.R., "On the use of refractive-index-matched hydrogel for fluid velocity measurements in and around geometrically complex solid obstructions," *Experiments in Fluids*, 55, DOI 10.1007/s00348-014-1862-x, 1862- 1874, 2014.
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- Zeller, R.B., Weitzman, J.S., Abbett, M.E., Zarama, F.J., Fringer, O.B., and J.R. Koseff, "Improved parameterization of seagrass blade dynamics and wave attenuation based on numerical and laboratory experiments," *Limnology and Oceanography*, 59(1), 251-266, 2014.
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- Hult, E.L., Troy, C.D., and Koseff, J.R., "Harmonic generation of interfacial waves at a submerged bathymetric ridge," *Journal of Geophysical Research-Oceans*, 115, CO2001, 2010.
- Hult, E.L., Troy, C.D., and Koseff, J.R., "The breaking of interfacial waves at a submerged bathymetric ridge," *Journal of Fluid Mechanics*, 637, 45-71, 2010.
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