

Stanford



Derek Fong

Sr Research Engineer

Civil and Environmental Engineering

Bio

BIO

Derek Fong's research in environmental and geophysical fluid dynamics focuses on understanding the fundamental transport and mixing processes in the rivers, estuaries and the coastal ocean. He employs different methods for studying such fluid processes including laboratory experiments, field experiments, and numerical modeling. His research projects include studying lateral dispersion, in stratified coastal flows, the fate and transport of freshwater in river plumes, advanced hydrodynamic measurement techniques, coherent structures in nearshore flows, bio-physical interactions in stratified lakes, fate of contaminated sediments, and secondary circulation and mixing in curved channels.

Derek teaches a variety of classes at both the undergraduate and graduate level. Some of the classes he has offered include Mechanics of Fluids; Rivers, Streams and Canals; Transport and Mixing in Surface Waters; Introduction to Physical Oceanography; Mechanics of Stratified Fluids; Dynamics of Lakes and Reservoirs; Science and Engineering Problem Solving using Matlab; the Future and Science of Water; Hydrodynamics and Geophysical Fluid Dynamics.

Prior to coming to Stanford, Derek spent five years at the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution studying the dynamics of freshwater plumes for his doctoral thesis. He has also served as a senior lecturer at the University of Washington, Friday Harbor Laboratories in Friday Harbor, Washington.

ACADEMIC APPOINTMENTS

- Sr Research Engineer, Civil and Environmental Engineering

HONORS AND AWARDS

- SSP Teaching Award, Singapore-Stanford Partnership (2007)
- Pritchard Award, Coastal Estuarine Research Federation (2012)

PROFESSIONAL EDUCATION

- B.S., Stanford University , Civil Engineering, with distinction (1991)
- M.S., Stanford University , Water Resources Engineering (1992)
- Ph D., MIT/WHOI Joint Program , Physical Oceanography (1998)

Teaching

COURSES

2022-23

- Big Earth Hackathon Wildland Fire Challenge: CEE 165H, CEE 265H (Spr)
- Engineering Economics and Sustainability: CEE 146S, ENGR 60 (Sum)
- Integrated Civil Engineering Design Project: CEE 183 (Spr)
- Introduction to Mechanics of Fluids: CEE 101E (Sum)
- Introduction to Physical Oceanography: CEE 162D, CEE 262D, EARTHSYS 164, ESS 148 (Win)
- Rivers, Streams, and Canals: CEE 162E, CEE 262E (Spr)

2021-22

- Big Earth Hackathon Wildland Fire Challenge: CEE 165H (Spr)
- Computations in Civil and Environmental Engineering: CEE 101D, CEE 201D (Aut)
- Engineering Economics and Sustainability: CEE 146S, ENGR 60 (Sum)
- Integrated Civil Engineering Design Project: CEE 183 (Spr)
- Introduction to Mechanics of Fluids: CEE 101E (Sum)
- Introduction to Physical Oceanography: CEE 162D, CEE 262D (Win)
- Rivers, Streams, and Canals: CEE 162E, CEE 262E (Spr)

2020-21

- Introduction to Physical Oceanography: CEE 162D, CEE 262D, EARTHSYS 164, ESS 148 (Win)
- Rivers, Streams, and Canals: CEE 162E, CEE 262E (Spr)

2019-20

- Big Earth Hackathon Wildland Fire Challenge: CEE 165H, CEE 265H, EARTH 165H, EARTH 265H (Spr)
- Mechanics of Fluids: CEE 101B (Aut)
- Mechanics of Fluids: CEE 162A (Aut)

Publications

PUBLICATIONS

- **Characterization of the biological, physical, and chemical properties of a toxic thin layer in a temperate marine system** *MARINE ECOLOGY PROGRESS SERIES*
McManus, M. A., Greer, A. T., Timmerman, A. H., Sevadjan, J. C., Woodson, C., Cowen, R., Fong, D. A., Monismith, S., Cheriton, O. M.
2021; 678: 17-35
- **Circulation patterns in a shallow tropical reservoir: Observations and modeling** *JOURNAL OF HYDRO-ENVIRONMENT RESEARCH*
Yang, P., Fong, D. A., Lo, E. M., Monismith, S. G.
2019; 27: 75-86
- **Vertical mixing in a shallow tropical reservoir** *LIMNOLOGY*
Yang, P., Fong, D. A., Lo, E., Monismith, S. G.
2019; 20 (3): 279-96
- **Modeling Sedimentation Dynamics of Sediment-Laden River Intrusions in a Rotationally-Influenced, Stratified Lake** *WATER RESOURCES RESEARCH*
Scheu, K. R., Fong, D., Monismith, S. G., Fringer, O. B.
2018; 54 (6): 4084-4107
- **One-Dimensional Particle Tracking with Streamline Preserving Junctions for Flows in Channel Networks** *JOURNAL OF HYDRAULIC ENGINEERING*
Sridharan, V. K., Monismith, S. G., Fong, D. A., Hench, J. L.
2018; 144 (2)
- **Modeling Intrajunction Dispersion at a Well-Mixed Tidal River Junction** *JOURNAL OF HYDRAULIC ENGINEERING*
Wolfram, P. J., Fringer, O. B., Monsen, N. E., Gleichauf, K. T., Fong, D. A., Monismith, S. G.

2016; 142 (8)

- **Observations of vertical eddy diffusivities in a shallow tropical reservoir** *JOURNAL OF HYDRO-ENVIRONMENT RESEARCH*
Yang, P., Xing, Z., Fong, D. A., Monismith, S. G., Tan, K. M., Lo, E. Y.
2015; 9 (3): 441-451
- **Scale-Dependent Dispersion within the Stratified Interior on the Shelf of Northern Monterey Bay** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
Moniz, R. J., Fong, D. A., Woodson, C. B., Willis, S. K., Stacey, M. T., Monismith, S. G.
2014; 44 (4): 1049-1064
- **Using Depth-Normalized Coordinates to Examine Mass Transport Residual Circulation in Estuaries with Large Tidal Amplitude Relative to the Mean Depth** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
Giddings, S. N., Monismith, S. G., Fong, D. A., Stacey, M. T.
2014; 44 (1): 128-148
- **Thermal structure and variability of a shallow tropical reservoir** *LIMNOLOGY AND OCEANOGRAPHY*
Xing, Z., Fong, D. A., Lo, E. Y., Monismith, S. G.
2014; 59 (1): 115-128
- **Water and heat budgets of a shallow tropical reservoir** *WATER RESOURCES RESEARCH*
Xing, Z., Fong, D. A., Tan, K. M., Lo, E. Y., Monismith, S. G.
2012; 48
- **Frontogenesis and Frontal Progression of a Trapping-Generated Estuarine Convergence Front and Its Influence on Mixing and Stratification** *ESTUARIES AND COASTS*
Giddings, S. N., Fong, D. A., Monismith, S. G., Chickadel, C. C., Edwards, K. A., Plant, W. J., Wang, B., Fringer, O. B., Horner-Devine, A. R., Jessup, A. T.
2012; 35 (2): 665-681
- **Role of straining and advection in the intratidal evolution of stratification, vertical mixing, and longitudinal dispersion of a shallow, macrotidal, salt wedge estuary** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
Giddings, S. N., Fong, D. A., Monismith, S. G.
2011; 116
- **Remotely sensed river surface features compared with modeling and in situ measurements** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
Plant, W. J., Branch, R., Chatham, G., Chickadel, C. C., Hayes, K., Hayworth, B., Horner-Devine, A., Jessup, A., Fong, D. A., Fringer, O. B., Giddings, S. N., Monismith, S., Wang, et al
2009; 114
- **Turbulent Stresses and Secondary Currents in a Tidal-Forced Channel with Significant Curvature and Asymmetric Bed Forms** *JOURNAL OF HYDRAULIC ENGINEERING-ASCE*
Fong, D. A., Monismith, S. G., Stacey, M. T., Bureau, J. R.
2009; 135 (3): 198-208
- **Thermal Variability in a Tidal River** *ESTUARIES AND COASTS*
Monismith, S. G., Hench, J. L., Fong, D. A., Nidzieko, N. J., Fleenor, W. E., Doyle, L. P., Schladow, S. G.
2009; 32 (1): 100-110
- **High-resolution simulations of a macrotidal estuary using SUNTANS** *OCEAN MODELLING*
Wang, B., Fringer, O. B., Giddings, S. N., Fong, D. A.
2009; 28 (1-3): 167-192
- **High-resolution simulations of a macrotidal estuary using SUNTANS** *OCEAN MODELLING*
Wang, B., Fringer, O. B., Giddings, S. N., Fong, D. A.
2009; 26 (1-2): 60-85
- **Evidence for the inherent unsteadiness of a river plume: Satellite observations of the Niagara River discharge** *LIMNOLOGY AND OCEANOGRAPHY*
Horner-Devine, A. R., Fong, D. A., Monismith, S. G.
2008; 53 (6): 2731-2737
- **Plume dispersion on a fringing coral reef system** *LIMNOLOGY AND OCEANOGRAPHY*
Jones, N. L., Lowe, R. J., Pawlak, G., Fong, D. A., Monismith, S. G.

2008; 53 (5): 2273-2286

- **Characterizing sources of groundwater to a tropical coastal lagoon in a karstic area using radium isotopes and water chemistry** *MARINE CHEMISTRY*
Young, M. B., Gonnee, M. E., Fong, D. A., Moore, W. S., Herrera-Silveira, J., Paytan, A.
2008; 109 (3-4): 377-394
- **Comparison of Reynolds stress estimates derived from standard and fast-ping ADCPs** *JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY*
Nidzieko, N. J., Fong, D. A., Hench, J. L.
2006; 23 (6): 854-861
- **Laboratory experiments simulating a coastal river inflow** *JOURNAL OF FLUID MECHANICS*
Horner-Devine, A. R., Fong, D. A., Monismith, S. G., Maxworthy, T.
2006; 555: 203-232
- **Salvaging velocity measurements corrupted by nearby instruments** *LIMNOLOGY AND OCEANOGRAPHY-METHODS*
Palmarsson, S. O., Schladow, S. G., Fong, D. A.
2005; 3: 263-274
- **Evaluation of the accuracy of a ship-mounted, bottom-tracking ADCP in a near-shore coastal flow** *JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY*
Fong, D. A., Monismith, S. G.
2004; 21 (7): 1121-1128
- **Dispersal scaling from the world's rivers** *GEOPHYSICAL RESEARCH LETTERS*
Warrick, J. A., Fong, D. A.
2004; 31 (4)
- **Horizontal dispersion of a near-bed coastal plume** *JOURNAL OF FLUID MECHANICS*
Fong, D. A., Stacey, M. T.
2003; 489: 239-267
- **The alongshore transport of freshwater in a surface-trapped river plume** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
Fong, D. A., Geyer, W. R.
2002; 32 (3): 957-972
- **Response of a river plume during an upwelling favorable wind event** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
Fong, D. A., Geyer, W. R.
2001; 106 (C1): 1067-1084
- **A simple model of mixing in stratified tidal flows** *Journal of Geophysical Research*
Monismith, S. G., Fong, D. A.
1996; 101: 28583-28597