

# Curriculum Vitae

## David H. Richter

### Education

2007-2011 Ph.D. Mechanical Engineering, Stanford University  
2006-2007 M.S. Mechanical Engineering, Stanford University  
2002-2006 B. S. Mechanical Engineering, University of Massachusetts, Amherst

### Appointments/Positions

2014-present Concurrent Assistant Professor, Department of Aerospace and Mechanical Engineering, University of Notre Dame, Notre Dame, IN  
2013-present Assistant Professor, Department of Civil & Environmental Engineering and Earth Sciences, University of Notre Dame, Notre Dame, IN  
2011-2013 Advanced Study Program Postdoctoral Fellow, National Center for Atmospheric Research, Boulder, CO  
2006-2011 Research Assistant, Mechanical Engineering Department, Stanford University, Stanford, CA  
2005-2006 Undergraduate Research Assistant, Mechanical Engineering Department, University of Massachusetts, Amherst, MA  
2005 Summer Engineering Intern, National Center for Atmospheric Research, Boulder, CO

### Awards and Memberships

Chair, AMS Air-Sea Interaction Committee	2017-2020
Office of Naval Research Young Investigator Program Awardee	2016-2019
Elected CEEES Faculty Commencement Speaker	2015
Advanced Study Program Postdoctoral Fellowship	2011-2013
Stanford Graduate Fellowship	2008-2011
School of Engineering Graduate Fellowship, Stanford University	2006-2007
Graduated <i>Cum Laude</i> from University of Massachusetts	2006
Member, American Physical Society	2007-present
Member, American Geophysical Union	2012-present
Member, American Meteorological Society	2013-present

### Refereed Publications

1. Richter, D.H. and Chamecki, M., Vertical concentration profiles of heavy, inertial particles in the turbulent boundary layer, Under review in *Boundary-Layer Meteorology*
2. Sweet, J., Richter, D.H., Thain, D., and Sweet, C., Accelerating mixed Eulerian-Lagrangian particle-laden flow simulation using a hybrid CPU-GPU system, Under review as a technical paper at The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC17)

3. Wright, E., Richter, D.H., and Bolster, D., The effects of incomplete mixing on reactive transport in flows through heterogeneous porous media, Under review in *Physical Review Fluids*
4. Peng, T. and Richter, D.H., Influence of evaporating droplets in the turbulent marine atmospheric boundary layer, In press at *Boundary-Layer Meteorology*
5. González, C., Richter, D.H., Bolster, D., Calantoni, J., Bateman, S., Escauriaza, C., 2017, Characterization of bedload intermittency near the threshold of motion using a Lagrangian sediment transport model, *Environmental Fluid Mechanics*, **17**, pp 111-137, doi:10.1007/s10652-016-9476-x
6. Richter, D.H., Veron, F., 2016, Ocean spray: An outsized influence on weather and climate, *Physics Today*, **69**(11), 34-39, 10.1063/PT.3.3363
7. Richter, D.H., Bohac, R., Stern, D., 2016, An assessment of the flux profile method for determining momentum and enthalpy fluxes from dropsonde data, *Journal of the Atmospheric Sciences*, **73**, pp 2665-2682, 10.1175/JAS-D-15-0331.1
8. Richter, D.H., Garcia, O., Astephen, C., 2016, Particle stress in dilute, polydisperse, two-way coupled turbulent flows, *Physical Review E*, **93**, pp 01311, doi:10.1103/PhsRevE.93.013111
9. Helgans, B., Richter, D.H., 2016, Turbulent latent and sensible heat flux in the presence of evaporative droplets, *International Journal of Multiphase Flow*, *International Journal of Multiphase Flow*, **78**, pp 1-11, doi:10.1016/j.ijmultiphaseflow.2015.09.010
10. Richter, D.H., 2015, Turbulence modification by inertial particles and its influence on the spectral energy budget in planar Couette flow, *Physics of Fluids*, **27**, pp 063304, doi:10.1063/1.4923043
11. Richter, D.H., Sullivan, P.P., 2014, Modification of near-wall coherent structures by inertial particles, *Physics of Fluids*, **26**, pp 103304, doi:10.1063/1.4900583
12. Richter, D.H., Stern, D.P., 2014, Evidence of spray-mediated air-sea enthalpy flux within tropical cyclones, *Geophysical Research Letters*, **41**, pp 2997-3003, doi:10.1002/2014GL059746
13. Richter, D.H., Sullivan, P.P., 2014, The sea spray contribution to sensible heat flux. *Journal of the Atmospheric Sciences*, **71**, pp 640-654, doi:10.1175/JAS-D-13-0204.1.
14. Richter, D.H., Sullivan, P.P., 2013, Momentum transfer in a turbulent, particle-laden Couette flow. *Physics of Fluids*, **25**, pp 053304, doi:10.1063/1.4804391.
15. Richter, D.H., Sullivan, P.P., 2013, Sea surface drag and the role of spray. *Geophysical Research Letters*, **40**, pp 656-660, doi:10.1002/grl.50163.
16. Richter, D.H., Iaccarino, G., Shaqfeh, E.S.G. 2012, Effects of viscoelasticity in the high Reynolds number cylinder wake. *Journal of Fluid Mechanics*, **693**, pp 297-318

17. Richter, D.H., Shaqfeh, E.S.G., Iaccarino, G., 2011, Numerical simulation of polymer injection in turbulent flow past a circular cylinder. *Journal of Fluids Engineering*, **133**, pp 104501-(1-5)
18. Richter, D.H., Shaqfeh, E.S.G., Iaccarino, G., 2010, Floquet stability analysis of viscoelastic flow over a cylinder. *Journal of Non-Newtonian Fluid Mechanics*, **166**, pp 554-565
19. Richter, D.H., Iaccarino, G., Shaqfeh, E.S.G., 2010, Simulations of three-dimensional viscoelastic flows past a circular cylinder at moderate Reynolds numbers. *Journal of Fluid Mechanics*. **651**, pp 415-442
20. Teixeira, R., Dambal, A., Richter, D.H., Shaqfeh, E.S.G., Chu, S., 2007, The individualistic dynamics of entangled DNA in solution. *Macromolecules*, **40**, pp 2461-2476
21. Bhardwaj, A., Richter, D.H., Chellamuthu, M., Rothstein, J.P., 2007, The effect of pre-shear on the extensional rheology of wormlike micelle solutions. *Rheologica Acta*, **46**, pp 1435-1528

### **Refereed Conference Proceedings**

1. Park, H., O'Keefe, K., Richter, D.H., 2017, Modification of buoyancy-driven turbulence by thermally and dynamically coupled inertial particles, in the Proceedings of the Tenth International Symposium on Turbulence and Shear Flow Phenomena, Chicago, IL
2. Richter, D.H., Garcia, O., Astephen, C., 2015, Turbulence modification in polydisperse, wall-bounded turbulence, In the Proceedings of the Ninth International Symposium on Turbulence and Shear Flow Phenomena, Melbourne, Australia

### **Invited Presentations**

1. "Investigating the basic fluid mechanics of multiphase geophysical flows", presented at the University of Minnesota Mechanical Engineering Lecture Series, Minneapolis, MN, April 18, 2017
2. "Using DNS to investigate multiphase turbulence in the environment", presented at the Pennsylvania State University Fluid Dynamics Research Consortium Seminar Series, Penn State University, State College, November 10, 2016
3. "Using direct numerical simulations to investigate multiphase turbulence in the atmosphere", presented at the Mechanical Engineering Departmental Seminar, University of Texas at Dallas, September 30, 2016
4. "The turbulent atmospheric boundary layer", a lecture given to students at the California State University at Chico, Chico, CA, April 22, 2016
5. "Investigating the basic fluid mechanics of multiphase geophysical flows", presented at the Stanford University Fluid Dynamics Seminar Series, Stanford, CA, March 29, 2016

6. "How far does a dispersed phase influence turbulence?", presented as an invited speaker at the Fundamental Aspects of Geophysical Turbulence II Conference, National Center for Atmospheric Research, Boulder, CO, August 5, 2015
7. "Dispersed phase effects on wall-bounded turbulence and its upscale influence", presented at the University of Illinois Department of Mechanical Science and Engineering Fluid Dynamics Seminar, Urbana, IL, November 7, 2014
8. "A small-scale perspective on turbulent fluxes in the spray-laden marine boundary layer: Results from DNS", presented at the Pennsylvania State University Meteorology Colloquium, State College, PA, October 8, 2014
9. "A small-scale perspective of the spray-laden marine atmospheric boundary layer", Space and Atmospheric Physics (Dept. of Physics) research seminar, Imperial College London, London, UK, June 13, 2014
10. "Spray-modified fluxes in the marine atmospheric boundary layer", presented at Brookhaven National Labs, Upton, NY, December 23, 2013
11. "Turbulent transport at the spray-laden air-sea interface", seminar at the Naval Research Labs, Monterey, CA, May 21, 2013
12. "Turbulent transport in the spray-laden, high-wind marine boundary layer", Mechanical & Aerospace Engineering Departmental Seminar, University of Florida, Gainesville, FL, April 16, 2013
13. "Sea-spray and its effects on near-surface turbulence", invited lecture at the Multiphase Turbulent Flows in the Atmosphere and Ocean Workshop at the National Center for Atmospheric Research, Boulder, CO, August 15, 2012
14. "Transition to turbulence in the viscoelastic bluff body wake", Department of Applied Math Departmental Seminar, University of California Davis, Davis, CA, October 20, 2010

## **Posters and Presentations**

(boldface indicates presenter)

1. **Elise Wright**, Bolster, D., and Richter, D.H., "The impact of incomplete mixing on reactive transport through heterogeneous porous media", poster presentation at the 9<sup>th</sup> International Conference on Porous Media, Thursday, May 11, 2017
2. **Rocha-Brownell, K.**, Dérian, P., Richter, D.H., Sullivan, P.P., and Mayor, S.D., "Evaluation of a wavelet-based optical flow algorithm through the use of large eddy simulations", presentation at the American Meteorological Society Annual Meeting, Seattle, WA, Wednesday, January 25, 2017
3. **Wright, E.**, Bolster, D., and Richter, D.H., "The effects of incomplete mixing on reactive transport in flows through heterogeneous porous media using a Lagrangian particle tracking method", poster presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, Friday, December 16, 2016

4. **Richter, D.H.**, “Heavy particle transport in the turbulent boundary layer”, presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, Tuesday, December 13, 2016
5. **Peng, T.** and Richter, D.H., “Impact of droplets on turbulent latent and sensible heat flux at the air-sea boundary”, poster presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, Tuesday, December 13, 2016
6. **Rocha-Brownell, K.**, Dérian, P., Richter, D.H., Sullivan, P.P., and Mayor, S.D., “Evaluation of a wavelet-based optical flow algorithm through the use of large eddy simulations”, presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, Tuesday, December 13, 2016
7. **Richter, D.H.**, Garcia, O., and Astephen, C., “Momentum transfer and particle stress in polydisperse, particle-laden flow”, presentation at the American Physical Society Division of Fluid Dynamics Meeting, Portland, OR, Monday, November 21, 2016
8. **Richter, D.H.** and Helgans, B., “Dispersed phase effects on boundary layer turbulence”, poster presentation at the American Physical Society Division of Fluid Dynamics Meeting, Portland, OR, Monday, November 21, 2016
9. **Soto, K.**, Escauriaza, C., Richter, D.H., “Multiscale simulations for the study of marine hydrokinetic devices”, poster presentation at the 2016 International Network on Offshore Renewable Energy North American Symposium, Orono, ME, October 29, 2016
10. **Peng, T.**, and Richter, D. H., “Impact of droplets on latent and sensible heat flux at the air-sea interface”, presentation at the American Meteorological Society Conference on Air-Sea Interaction, Madison, WI, Monday, August 15, 2016
11. **Richter, D.H.** Bohac, R., and Stern, D. P., “The reliability of using dropsondes for high-wind air-sea flux estimates”, presentation at the American Meteorological Society Conference on Air-Sea Interaction, Madison, WI, Monday, August 15, 2016
12. **Richter, D.H.** and Helgans, B., “Dispersed phase effects on boundary layer turbulence”, poster presentation at the American Meteorological Society Symposium on Boundary Layer Turbulence, Salt Lake City, UT, Monday, June 22, 2016
13. **Richter, D.H.**<sup>#</sup> and Helgans, B., “Turbulent heat fluxes under the influence of evaporating droplets”, presentation at the 9<sup>th</sup> International Conference on Multiphase Flow, Wednesday, May 25, 2016 (<sup>#</sup> presented in absentia by colleague Filippo Coletti of U. of Minnesota due to paternity leave)
14. **Wright, E.**, Bolster, D., and Richter, D.H., “Lagrangian models to study incomplete mixing of reactive transport in heterogeneous velocity fields”, presentation at the 8<sup>th</sup> International Conference on Porous Media, Thursday, May 2, 2016
15. **Richter, D.H.**, Bohac, R., Stern, D., “Using dropsondes to estimate surface fluxes in tropical cyclones: Uncertainty and reliability”, presentation at the American Meteorological Society 32<sup>nd</sup> Conference on Hurricanes and Tropical Meteorology, San Juan, Puerto Rico, April 19, 2016
16. **González, C.**, Richter, D.H., Bolster, Bateman, S., D., Calantoni, J., Escauriaza, C., “Statistical characterization of the motion of sediment particles in oscillatory flows”,

poster presentation at the Ocean Sciences Meeting, New Orleans, LA, February 22, 2016

17. **Richter, D.H.**, Bohac, R., Stern, D., “Determining high-wind enthalpy fluxes from dropsonde profiles in tropical cyclones”, poster presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, December 18, 2015
18. **Soto, K.**, Escauriaza, C., Richter, D.H., “Interactions of marine hydrokinetic devices in complex bathymetries: Numerical simulations in the Chacao Channel in Southern Chile”, poster presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, December 18, 2015
19. **González, C.**, Richter, D.H., Bolster, D., Calantoni, J., Bateman, S., Escauriaza, C., “Statistical characterization of the intermittency of bedload transport in conditions near the threshold of motion”, poster presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, December 15, 2015
20. González, C., Escauriaza, C., **Richter, D.H.**, Bolster, D., Calantoni, J., “On the intermittency of sediment transport in conditions near the threshold of motion”, presentation at the American Physical Society Division of Fluid Dynamics Meeting, Boston, MA, November 24, 2015
21. **Richter, D.H.**, “Particle-induced influences on the spectral TKE budget in wall-bounded turbulence”, presentation at the American Physical Society Division of Fluid Dynamics Meeting, Boston, MA, November 22, 2015
22. **Richter, D.H.**, Garcia, O., Astephen, C., “Turbulence modification in polydisperse, wall-bounded turbulence”, presentation at the 9<sup>th</sup> International Symposium on Turbulence and Shear Flow Phenomena (TSFP-9), Melbourne, Australia, July 2, 2015
23. **Richter, D.H.**, “The large-scale influence of small-scale dispersed phase elements in turbulence”, presentation at the International Conference on Model Integration Across Disparate Scales in Complex Turbulent Flow Simulation, State College, PA, June 16, 2015
24. **Richter, D.H.**, Bohac, R., Stern, D.P., “Air-sea thermodynamic fluxes and a signature of spray effects”, presentation at the American Meteorological Society Conference on Air-Sea Interaction, Phoenix, AZ, January 6, 2015
25. **Richter, D.H.**, Bohac, R., Stern, D.P., “Air-sea enthalpy fluxes and evidence of spray effects within tropical cyclones”, presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, December 15, 2014
26. **González, C.**, Escauriaza, C., Richter, D.H., Calantoni, J., Bolster, D., “Characterization of the intermittent behavior of sediment transport from numerical simulations on a flat bed channel”, poster at the American Geophysical Union Annual Meeting, San Francisco, CA, December 18, 2014
27. **Richter, D.H.**, Sullivan, P.P., “Spray-mediated sensible heat flux in shear-driven turbulence”, presentation at the American Meteorological Society Symposium on Boundary Layer Turbulence, Leeds, UK, June 9, 2014
28. **Richter, D.H.**, Stern, D.P., “Tropical cyclone air-sea enthalpy flux estimates from dropsonde profiles”, presentation at the American Meteorological Society

Conference on Hurricanes and Tropical Meteorology, San Diego, CA, March 31, 2014

29. **Richter, D.H.**, Stern, D.P., "Sensible heat flux at the spray-laden air-sea interface", presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, December 13, 2013
30. **Richter, D.H.**, "Near-wall particle-laden turbulent transport", presentation at the American Physical Society Division of Fluid Dynamics Meeting, Pittsburgh, PA, November 26, 2013
31. **Richter, D.H.**, Sullivan, P.P., "Sea spray dynamics in the marine boundary layer", presentation at the American Geophysical Union Annual Meeting, San Francisco, CA, December 3, 2012
32. **Richter, D.H.**, Sullivan, P.P., "Near-surface sea spray dynamics via simulations of particle-laden, turbulent Couette flow", presentation at the American Physical Society Division of Fluid Dynamics Meeting, San Diego, CA, November 19, 2012
33. **Richter, D.H.**, Sullivan, P.P., "Turbulence and momentum flux modification in the presence of sea spray", presentation at the American Meteorological Society's 18<sup>th</sup> Conference on Air-Sea Interaction, Boston, MA, July 10, 2012
34. **Richter, D.H.**, Sullivan, P.P., "Sea spray dynamics in the marine boundary layer", poster at the Ocean Sciences Meeting, Salt Lake City, UT, February 21, 2012
35. **Richter, D.H.**, Iaccarino, G., Shaqfeh, E.S.G., "Simulations of high Reynolds number wake transition in the presence of viscoelasticity", presentation at the American Physical Society Division of Fluid Dynamics Meeting, Long Beach, CA, November 23, 2010
36. **Richter, D.H.**, Iaccarino, G., Shaqfeh, E.S.G., "Simulations of wake stabilization in viscoelastic flow past a cylinder", presentation at the American Institute of Chemical Engineers Annual Meeting, Salt Lake City, UT, November 8, 2010
37. **Richter, D.H.**, Iaccarino, G., Shaqfeh, E.S.G., "Effects of viscoelasticity on the inertial wake in flow past a circular cylinder", presentation at the Society of Rheology Annual Meeting, Santa Fe, NM, October 26, 2010
38. **Richter, D.H.**, Shaqfeh, E.S.G., Iaccarino, G., "Simulations of wake stabilization in viscoelastic flow past a circular cylinder", presentation at the International Workshop on Numerical Methods for Non-Newtonian Flows, Northampton, MA, June 14, 2010
39. **Richter, D.H.**, Iaccarino, G., Shaqfeh, E.S.G., "Numerical simulations of time-dependent, fully 3D viscoelastic flows past bluff bodies", presentation at the American Physical Society Division of Fluid Dynamics Meeting, San Antonio, TX, November 24, 2008
40. **Richter, D.H.**, Shaqfeh, E.S.G., Iaccarino, G., "Numerical investigations of fully 3D, time-dependent viscoelastic flows past bluff bodies at moderate to high Reynolds numbers", presentation at the International Congress of Rheology, Monterey, CA, August 8, 2008
41. **Richter, D.H.**, Iaccarino, G., Shaqfeh, E.S.G., "Numerical investigations of time-dependent viscoelastic flows in complex geometries", presentation at the Thermal

and Fluid Sciences Affiliates and Sponsors 2008 Conference, Stanford, CA,  
February 7, 2008

**Patents**

Semmer, S., Richter, D., Oncly, S., Delany, A., Schwenz, K., US Patent #8,182,613,  
"Radiometer including a cleaning system"