

Curriculum Vitae

Prof. Steven L. Ceccio
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PERSONAL

Name: Steven Louis Ceccio

Date and Place of Birth: August 13, 1964, Miami, FL

Degrees:

Ph.D. Mechanical Engineering, California Institute of Technology, 6/90
M.S. Mechanical Engineering, California Institute of Technology, 6/86
B.S. Mechanical Engineering, University of Michigan, Ann Arbor, 8/85

Positions at the University of Michigan:

ABS Professor of Marine and Offshore Design and Performance, 8/15 - present
Chair, Naval Architecture and Marine Engineering, 7/11 - present
Director, Naval Engineering Education Center, 5/10 – 9/15
Associate Vice President for Research, 9/04 – 8/09
Professor, Naval Architecture and Marine Engineering, 9/03 – present
Professor, Mechanical Engineering and Applied Mechanics, 9/03 – present
Associate Professor, Mechanical Engineering and Applied Mechanics, 9/96 – 9/03
Assistant Professor, Mechanical Engineering and Applied Mechanics, 9/90 – 9/96

Positions at Other Institutions or Organizations:

Member, Defense Science Studies Group, Institute for Defense Analysis, 1/00 –12/02
Research Fellow, American Society for Engineering Education,
NSWC-CD, U.S. Navy, 6/93-8/93
Postdoctoral Fellow, California Institute of Technology, 6/90-9/90
Research Assistant, California Institute of Technology, 9/84-6/85

Honors and Awards:

ASME Freeman Scholar, 2014
Elected APS Fellow, 2009
Elected ASME Fellow, 2005
Dept. of Energy Young Scientist and Engineer Award-Defense Programs, 1996
MEAM Teaching Award, 1994
Francis J. Cole Fellowship, 1988-1989
ARCS Fellowship, 1986-1988
Special Institute Fellowship, California Institute of Technology, 1985-1986
Graduated Summa Cum Laude, University of Michigan, 1985

TEACHING

New Courses Introduced at the University of Michigan:

ME395- Thermal/Fluids Laboratory: Principles and experimental techniques in thermal fluid sciences are explored in lectures and experiments. Basic topics include: measurement of fundamental quantities and system analysis as applied to devices involving thermodynamics, fluid mechanics, and heat transfer. Emphasis is placed on report writing and teamwork skills. The course was first taught in the winter 1993 semester. The course has now been transformed into ME395- Laboratory I.

ME495- Laboratory II: Weekly lectures and extended experimental projects designed to demonstrate experimental and analytical methods as applied to complex mechanical systems. Emphasis is placed on laboratory report writing, oral presentation, and team-building skills. The course was first taught in winter 1998. The course is now being taught every semester as a required undergraduate course.

ME 527- Multiphase Flow: A graduate level class surveying selected topics in multiphase flow. Topic include basic modeling concepts in multiphase flow, dynamics of bubbles, drops and particles, homogeneous particulate flows, bubbly flow, fluidized beds, gas-liquid flows, sprays, granular flows, Stokesian modeling, two-fluid models and the problem of closure, cavitation, and topics suggested by the class. The course was taught for the first time in winter 1995. Typical enrollment is around 15 to 25 students.

Courses Taught at the University of Michigan:

| Course Number | Course Title | Semester | Enrollment |
|----------------------|------------------------|-----------------|-------------------|
| ME 236 | Thermodynamics I | Fall 90 | 44 |
| ME 324 | Fluid Mechanics I | Winter 91 | 45 |
| ME 521 | Adv. Fluid Mechanics I | Fall 91 | 22 |
| ME 236 | Thermodynamics I | Winter 92 | 58 |

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|--------|-----------------------------------------------------|-----------|-----|
| ME 499 | Special Topics (ME 395 Development) | Fall 92 | 12 |
| ME 395 | Thermal/Fluid Lab (with C. Borgnakke) | Winter 93 | 62 |
| ME 395 | Thermal/Fluid Lab (with M. Chen) | Fall 93 | 126 |
| ME 395 | Thermal/Fluid Lab (with M. Chen) | Winter 94 | 153 |
| ME 395 | Thermal/Fluid Lab (with A. Atreya) | Fall 94 | 121 |
| ME 527 | Multiphase Flow | Winter 95 | 27 |
| ME 395 | Thermal/Fluid Lab | Fall 95 | 93 |
| ME 320 | Fluid Mechanics I | Winter 96 | 42 |
| ME 395 | Thermal/Fluids Lab | Fall 96 | 85 |
| ME 572 | Multiphase Flow | Winter 97 | 15 |
| ME 495 | Laboratory II (with H. Peng) | Winter 98 | 87 |
| ME 495 | Laboratory II (with J. Barber) | Fall 98 | 148 |
| ME 527 | Multiphase Flow | Fall 99 | 27 |
| ME 495 | Laboratory II (with E. Arruda) | Fall 00 | 133 |
| ME 495 | Laboratory II (with M. Chen) | Fall 01 | 101 |
| ME 527 | Multiphase Flow | Winter 02 | 15 |
| ME 495 | Laboratory II (with B. Gillespie) | Winter 03 | 74 |
| ME 699 | Adv. Topics in Multiphase Flow | Winter 03 | 12 |
| ME495 | Laboratory II | Spring 03 | 42 |
| ME395 | Laboratory I (with D. Tilbury) | Winter 04 | 154 |
| ME527 | Multiphase Flow | Winter 06 | 15 |
| ME495 | Laboratory II (with E. Kannatey- Asibu) | Winter 07 | 125 |
| ME527 | Multiphase Flow | Fall 07 | 12 |
| ME495 | Laboratory II (with B. Gillespie and H. Peng) | Fall 08 | 110 |
| ME527 | Multiphase Flow | Fall 09 | 12 |
| ME495 | Laboratory II (with W. Schultz and T. Bress) | Winter 10 | 99 |
| ME495 | Laboratory II | Fall 10 | 88 |

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| | (with W. Schultz) | | |
| ME495 | Laboratory II (with E. Meyhofer) | Fall 11 | 95 |
| NA431 | Marine Engineering II | Winter 16 | 12 |

Ph. D. Committees Chaired:

1. Juliana Wu, “Shock and Re-entrant Jet Formation in Partial Cavities”, Winter 2018
2. Joel Hartenburger, “Effect of Roughness and Biofilms on Wall Bounded Shear Flows”, Winter 2018, co-chair with M. Perlin
3. Shahaboddin Alahyari, “Dynamics of Bubble Populations in Wall Bounded Turbulent Flow”, Fall 2017, co-chair with E. Johnsen
4. Casey Harwood, “Flow Structure Interaction of a Surface Piercing Hydrofoil”, Fall 2017, co-chair with Y. Young
5. Seongjin Yoon. “High Frame-Rate X-Ray Tomography System for Multiphase Flow”, Fall 2017, co-chair with S. Mäkiharju
6. James Gose, “Passive and Active Superhydrophobic Surfaces for Friction Drag Reduction”, Fall 2016, co-chair with M. Perlin
7. In-Ho Lee, “Gas Injection In a Liquid Cross Flow”, Summer 2015,
8. Harish Ganesh, “Bubbly Shock Propagation as a Cause of Sheet to Cloud Transition of Partial Cavitation and Stationary Cavitation Bubbles Forming on a Delta Wing Vortex,” Fall 2014
9. Simo Mäkiharju, “The Dynamics of Ventilated Partial Cavities Over a Wide Range of Reynolds Numbers and Quantitative 2D X-ray Densitometry for Multiphase Flow,” Fall 2011
10. Alexander Mychkovsky, “LDV Measurements and Analysis of Gas and Particulate Phase Velocity Profiles in a Vertical Jet Plume in a 2D Bubbling Fluidized Bed,” Winter 2010, co-chair with V. Sick
11. Adam Steinberg, “High Resolution Cinema-Stereo PIV for the Measurement of Turbulent Flame Dynamics,” Winter 2009, co-chair with J. Driscoll
12. Ryo Yakushiji, “Active Control of Vortex Cavitation Inception,” Summer 2009
13. Brian Elbing, “Influence of Roughness on Polymer and Microbubble Drag Reduction at High Reynolds Number,” Fall 2008, co-chair with M. Perlin.
14. Shiyao Bian, “Cinemagraphic PIV Analysis of a Turbulent Cavity Flow,” Summer 2007, co-chair with J. Driscoll
15. Natasha Chang, “Acoustic Characterization and Localization of Vortex Cavitation,” Summer 2007, co-chair with D. Dowling
16. Chinar Ramchandra Aphale, “Analysis of Cavitation in Friction Clutches,” Fall 2006, co-chair with W. W. Schultz
17. Eric Winkel, “Polymer and Microbubble Drag Reduction at High Reynolds Number,” Fall 2006, co-chair with M. Perlin
18. Jia Li, “Mistuning Identification,” Fall 2006, co-chair with C. Pierre
19. Jaehyung Choi, “Vortex-vortex Interactions and Cavitation Inception,” Winter, 2005
20. Paul Tortora, “Electrical Impedance Tomography for Gas-Solid Flows,” Fall, 2004

21. Jinhyun Cho, "Evaluation of Electrical Impedance Methods for the Measurement of Near Surface Gas Distributions," Spring 2004, co-chair with M. Perlin
22. Wendy Sanders, "Microbubble Friction Drag Reduction," Fall 2003, co-chair with D. Dowling
23. Ghanem Oweis, "Dynamics and Scaling of Leakage Vortex Cavitation Inception," Summer 2003
24. Dwayne Bourgoyne, "Examination of the High Reynolds Number Flow Over Lifting Surface," Winter 2003, co-chair with D. Dowling
25. Ansis Upatnieks, "Cinematographic PIV Investigation of the Lifted Turbulent Jet Flame Stabilization Region," Winter 2002, co-chair with J. Driscoll
26. John Judge, "Experimental-Based Development of Phenomenological Mistuning Models For Bladed Disks," Winter 2001, co-chair with C. Pierre
27. Claudia Iyer, "Investigation of Cavitating Shear Flows," Summer 2000
28. Judy Che, "Metal Drop Deposition and Droplet Based Manufacturing," Winter 1999, co-chair with G. Tryggvason
29. Kathy Laberteaux, "Generation of Flow Structures in the Closure Region of Attached Cavitation," Fall 1998
30. Sean Chambers, "Mechanics of Erythrocyte Hemolysis and Thrombosis During the Transport of Blood," Fall 1998, co-chair with R. Bartlett
31. Darin George, "Electrical Impedance Methods for the Measurement of Multiphase Flows," Fall 1998
32. Jaehoon Han, "Drop Deposition Manufacturing: Numerical Studies," Winter 1997, co-chair with G. Tryggvason
33. Ann Tassin, "Investigation of the Inception Region of Attached Cavitation," Fall 1996
34. Chih-Yang Li, "Interaction of Traveling Bubbles with the Boundary Layer and Attached Cavitation," Fall 1995
35. Po-Wen Yu, "Numerical and Experimental Investigation of Bubble and Sheet Cavitation," Fall 1995
36. Yi-Jou Jan, "Computational Studies of Bubble Dynamics," Spring 1994, co-chair with G. Tryggvason

M. S. Committees Chaired:

1. Nassim Abdul Samad, “Design, fabrication and testing of a Metal Window for Corrosion Testing,” Co-Chair with G. Was, Fall 2011
2. Richard Mooney, “Void Fraction Measurements in Air Layers,” Fall 2010
3. Drew Romes, “Hydrodynamics of Shock Absorber Tuning,” Winter 2008
4. Darren Holland, “Design and Calibration of Experimental Excitation Systems and Test Procedures for System Identification of Blisks,” co-Chair with M. Castanier, Winter 2008
5. Gregory Miller, “Air Layer Drag Reduction at High Reynolds Number,” Fall 2007
6. Elizabeth Ivy, “Characterization of the Microbubble Layer During Microbubble Drag Reduction in a Turbulent Boundary Layer at High Reynolds Number,” Winter, 2003, co-chair with D. Dowling
7. Josh Hamel, “Pressure Measurements in the Large Cavitation Channel,” Fall 2001
8. Daniel Peterman, “Design of a Recirculating Water Tunnel,” Fall 2000
9. Evert-Jan Foeth, “Observations of a Three-Dimensional Sheet Cavity on a Hydrofoil,” Winter 2000 (student at T-U Delft, with Prof. G. Kuiper)
10. Peter Kilcline, “Construction of a Small Water Tunnel,” Spring 1994

Post Doctoral Fellows and Visiting Scholars:

1. Harish Ganesh, Summer 2015 - present
2. Simo Mäkiharju, Winter 2012 – Summer 2014
3. Inwon Lee, Winter 2010-Winter 2011
4. Bu Guen Paik, Winter 2010-Winter 2011
5. Brian Elbing, Winter 2009 – Fall 2010
6. Natasha Chang, Summer 2007 – Summer 2009
7. Keary Lay, Winter 2006 – Fall 2009
8. Jaehyung Choi, Fall 2005 - Fall 2006
9. Kyungjin Lee, Winter 2006
10. Xaiochun Shen, Spring 2004 - Fall 2005
11. Marek Rebow, Fall 2003 – Fall 2004
12. Ghanem Oweis, Fall 2003 – Fall 2005
13. S. Gayton Liter, Winter 2001 –Fall 2002
14. Carolyn Judge, Fall 2000 – Fall 2002
15. Kathy Laberteaux, Winter 1999

PUBLICATIONS

Articles in refereed journals, transactions or archives:

1. Mäkiharju, S., Ganesh, H., and Ceccio, S. L., “On the dynamics of cloud cavitation and the effect of non-condensable gas”, *Journal of Fluid Mechanics*, (**in preparation**) (2016)
2. Golovin, K., Gose, J. W., J. M., Perlin, M., Ceccio, S. L., and Tuteja, A., “Bio-Inspired Surfaces for Turbulent Drag Reduction”, *Philosophical Transactions of the Royal Society A*, (**submitted**) (2016)
3. Golovin, K., Gose, J. W., Boban, M., Mabry, J. M., Perlin, M., Ceccio, S. L., and Tuteja, A., “Design of Superhydrophobic Surfaces for Drag Reduction in Turbulent Flow”, *Nature Communications*, (**submitted**) (2016)
4. Mäkiharju, S., Lee, I.-H., Filip, G., Maki, K., Ceccio, S. L., “The topology of gas jets injected beneath a surface and subject to liquid cross-flow”, *Journal of Fluid Mechanics*, (**submitted**) (2016)
5. Young, Y. L., Harwood, C.M., Miguel Montero, F., Ward, J. and Ceccio, S. L. “Ventilation of Lifting Surfaces: Review of the Physics and Scaling Relations”, *Applied Mechanics Reviews*, (**accepted**) (2016)
6. Ganesh, H., Mäkiharju, S., and Ceccio, S. L., “Bubbly shock propagation as a mechanism for sheet-to-cloud transition of partial cavities”, *Journal of Fluids Mechanics*, (**accepted**) (2016)
7. Harwood, C. M., Young, Y. L., and Ceccio, S. L. “Ventilated cavities on a surface piercing hydrofoil at moderate Froude numbers: cavity formation, elimination, and stability,” *Journal of Fluids Mechanics*, (**accepted**) (2016)
8. Perlin, M., Dowling, D. R., and Ceccio, S. L. (2015) “Freeman Scholar Review: Passive and Active Friction Drag Reduction of Turbulent Boundary Layers” *Journal of Fluids Engineering*, (**accepted**) (2016)
9. Lee, I.-H., Mäkiharju, S., Ganesh, H., and Ceccio, S. L., “Scaling of Gas Diffusion into Limited Partial Cavities,” *Journal of Fluids Engineering*, Vol. 138, No. 051301, pp. 1- 9 (2016)
10. Ganesh, H., Schot, J., and Ceccio, S. L. “Stationary Vortex Cavitation Bubbles Forming in a Delta Wing Vortex,” *Physics of Fluids*, Vol. 26, No. 127102, pp 1 – 19 (2014)
11. Bidkar, R. A., Leblanc, L., Kulkarni, A. J., Bahadur, V., Ceccio, S. L., and Perlin, M. “Skin Friction Drag Reduction in the Turbulent Regime Using Random-Textured Hydrophobic Surfaces,” *Physics of Fluids*, Vol. 26, No. 085108, pp 1 – 18 (2014)

12. Yang, J. W., Park, H., Chun, H. H., Ceccio, S. L., Perlin, M., and Lee, I. "Development of skin-friction reduction marine paint using polymer additive and its performance evaluation," *Ocean Engineering*, Vol. 84, pp 183–193 (2014)
13. Elbing, B. R., Perlin, M., Dowling, D. R., and Ceccio, S. L. "Modification of the Mean Near-Wall Velocity Profile of a High-Reynolds Number Turbulent Boundary Layer with the Injection of Drag-Reducing Polymer Solutions," *Physics of Fluids*, Vol. 25, No. 085103, pp 1-13 (2013)
14. Mäkiharju, S., Elbing, B., Wiggins, A., Schinasi, S., Perlin, M., J.-M. Vanden-Broeck, Dowling, D., Ceccio, S. L. "Influence of Reynolds and Froude Numbers on a Ventilated Partial Cavity," *Journal of Fluid Mechanics*, Vol. 732, pp 47-76 (2013)
15. Mäkiharju, S. A., Perlin, M. and Ceccio, S. L. "Time Resolved X-ray Densitometry of Cavitating and Ventilated Partial Cavities," *International Shipbuilding Progress*, Vol. 60 pp 471–494 (2013)
16. Wiggins, A., Zalek, S., Perlin, M., Ceccio, S. L., Doctors, L., and Etter, R. J. "Development of a Large Scale Surface Effect Ship Bow Seal Testing Platform," *Journal of Ship Production and Design*, Vol. 29, No. 4, pp 1–8 (2013)
17. Mäkiharju, S. A., Gabillet, C., Paik, B.-G., Chang, N. A., and Ceccio, S. L. "Time Resolved 2D X-Ray Densitometry of Two Phase Flow Behind a Ventilated Cavity" *Experiments in Fluids*, Vol. 54, pp 1561 - 1582 (2013)
18. Rangarajan, D., Mychkovsky, A. G., Curtis, J. S., and Ceccio, S. L., "Effect of emulsion fluidization state on the fluctuations in gas and particle velocities inside the plume of a gas jet penetrating a fluidized bed," *Powder Technology*, Vol. 242, pp 74-80 (2013)
19. Mäkiharju, S. A., Perlin, M., and Ceccio, S. L. "On the Energy Economics of Air Lubrication Drag Reduction," *International Journal of Naval Architecture and Ocean Engineering*, Vol. 4, No. 4, pp 412-422 (2013)
20. Elbing, B., Mäkiharju, S. A., Wiggins, A., Perlin, M., Dowling, D., Ceccio, S. L. "On the Scaling of Air Layer Drag Reduction," *Journal of Fluid Mechanics*, Vol. 717, pp 484 – 513 (2013)
21. Winkel, E. S., Cutbirth, J. M., Ceccio, S. L., Perlin, M., and Dowling, D. R. "Turbulence Profiles from a Smooth Flat-Plate Turbulent Boundary Layer at High Reynolds Number," *Experimental Thermal and Fluid Science*, Vol. 40, pp 140 - 149 (2012)
22. Mychkovsky, A.G. and Ceccio, S. L. "LDV measurements and analysis of gas and particulate phase velocity profiles in a vertical jet plume in a 2D bubbling fluidized bed Part III: The effect of fluidization," *Powder Technology*, Vol. 220, pp 37 - 46 (2012)

23. Mychkovsky, A.G. and Ceccio, S. L. “LDV measurements and analysis of gas and particulate phase velocity profiles in a vertical jet plume in a 2D bubbling fluidized bed Part II: Mass and Momentum Transport,” *Powder Technology*, Vol. 220, pp 47 - 54 (2012)
24. Mychkovsky, A.G., Rangarajan, D., and Ceccio, S. L. “LDV measurements and analysis of gas and particulate phase velocity profiles in a vertical jet plume in a 2D bubbling fluidized bed Part I: A Two phase LDV measurement technique,” *Powder Technology*, Vol. 220, pp 55 - 62 (2012)
25. Chang, N., Choi, J., Yakushiji, R., and Ceccio, S. L., “Cavitation inception during the interaction of a pair of counter-rotating vortices,” *Physics of Fluids*, Vol. 24, No. 014017, pp 1- 15 (2012)
26. Chang, N., Ganesh, H., Yakushiji, R., and Ceccio, S. L. “Tip Vortex Cavitation Suppression by Active Mass Injection,” *Journal of Fluids Engineering*, Vol. 133, No. 11, pp 1 – 11 (2011)
27. Chang, N. and Ceccio, S. L., “The acoustic emissions of cavitation bubbles in stretched vortices,” *Journal of the Acoustical Society of America*, Vol. 130, No. 5, pp 3209-3219 (2011)
28. Aphale, C. R., Schultz, W. W., and Ceccio, S. L. “Aeration in lubrication with application to drag torque reduction,” *Journal of Tribology*, Vol. 133, No. 3, pp 1 - 7 (2011)
29. Bian S., Driscoll, J. F., Elbing, B. R., and Ceccio, S. L., “Time Resolved Flow Field and Pressure Measurements of a Turbulent Mixing Layer Above a Rectangular Cavity,” *Experiments in Fluids*, Vol. 51, No. 1, pp 51 - 63 (2011)
30. Elbing, B. R., Solomon, M. J., Perlin, M, Dowling, D. R., and Ceccio, S. L. “Flow-induced Degradation of Drag-reducing Polymer Solutions Within a High-Reynolds Number Turbulent Boundary Layer”, *Journal of Fluid Mechanics*, Vol. 670, pp 337-364 (2011)
31. Holland, D. E., Castanier, M. P., Ceccio, S. L., Epureanu, B. I., and Filippi, S., “Testing and Calibration Procedures for Mistuning Identification and Traveling Wave Excitation of Blisks,” *Journal of Engineering for Gas Turbines and Power*, Vol. 132, No. 4, pp 1- 9 (042502) (2010)
32. Oweis, G. F., Winkel, E. S., Cutbirth, J. M., Ceccio, S. L., Perlin, M., and Dowling, D. R., “The Mean Velocity Profile of a Smooth Flat-Plate Turbulent Boundary Layer at High Reynolds Number” *Journal of Fluid Mechanics*, Vol. 665, pp 357 – 381 (2010)

33. Winkel E. S., Elbing, B. R., Dowling, D. R., Perlin, M., and Ceccio, S. L. "High-Reynolds-number turbulent-boundary-layer wall pressure fluctuations with dilute polymer solutions", *Physics of Fluids*, Vol. 22, No. 085104, pp 1 – 11 (2010)
34. Bian, S., Ceccio, S. L., and Driscoll, J. F., "Dual-Camera Digital Cinemagraphic Particle Imaging Velocimetry Measurements at KiloHertz Frame Rates," *Experiments in Fluids*, Vol. 48, No. 3, pp 487 -495 (2010)
35. Lay, K., Yakushiji, R., Mäkiharju, S., Perlin, M., and Ceccio, S. L., "Partial Cavity Drag Reduction at High Reynolds Numbers," *Journal of Ship Research*, Vol. 54, No. 2, pp 109-119 (2010)
36. Elbing, B. R., Dowling, D. R., Perlin, M., and Ceccio, S. L. "Diffusion of Drag-Reducing Polymer Solutions within a Rough-Walled Turbulent Boundary Layer", *Physics of Fluids*, Vol. 22, No. 054102, pp 1-13 (2010)
37. Ceccio, S. L. "Friction Drag Reduction of External Flows with Bubble and Gas Injection", *Annual Review of Fluid Mechanics*, Vol. 42, pp 183-203 (2010)
38. Aphale, C. R., Schultz, W. W., Ceccio, S. L., "The influence of grooves on the fully aerated flow between open clutch plates," *Journal of Tribology*, Vol. 132, No. 1, pp 1-7 (2010)
39. Mychkovsky, A. G., Chang, N. A., Ceccio, S. L., "Bragg cell laser intensity modulation: effect on laser Doppler velocimetry measurements," *Applied Optics*, Vol. 48, No. 18, pp 3468-3474 (2009)
40. Elbing, B. R., Winkel, E. S., Solomon, M. J., and Ceccio, S. L., "Degradation of Homogenous Polymer Solutions in Large Diameter, High Shear Turbulent Pipe Flow," *Experiments in Fluids*, Vol. 47, No. 6, pp 1033-1044 (2009)
41. Judge, J. A., Pierre, C. P., Castanier, M. P., and Ceccio, S. L., "Experimental Mistuning Identification in Bladed Disks using a Component Mode-Based Reduced-Order Model: Theory and Application," *AIAA Journal*, Vol. 47, No. 5., pp 1277-1287 (2009)
42. Steinberg, A. M., Driscoll, J. F., and Ceccio, S. L., "Measurement of Turbulent Premixed Flame Dynamics Using Cinema Stereoscopic PIV," *Experiments in Fluids*, Vol. 44, No. 6, pp 985-999 (2009)
43. Steinberg, A. M., Driscoll, J. F., and Ceccio, S. L., "Three-Dimensional Temporally Resolved Measurements of Turbulence-Flame Interactions Using Orthogonal-Plane Cinema-Stereoscopic PIV," *Experiments in Fluids*, Vol. 47, No. 3, pp 527 (2009)
44. Choi, J., Hsiao, C.-T., Chahine, G. L., and Ceccio, S. L., "Growth, Oscillation, and Collapse of Vortex Cavitation Bubbles," *Journal of Fluid Mechanics*, Vol. 624, pp 255-279 (2009)

45. Winkel, E. S., Oweis, G. F., Vanapalli, S. A., Dowling, D. R., Perlin, M., Solomon, M. J., and Ceccio, S. L. "High Reynolds number turbulent boundary layer friction drag reduction from wall-injected polymer solutions," *Journal of Fluid Mechanics*, Vol. 621 pp 259 – 288 (2009)
46. Steinberg, A. M., Driscoll, J. F., and Ceccio, S. L., "Temporal Evolution of Flame Stretch due to Turbulence and the Hydrodynamic Instability," *Proceedings of the Combustion Institute*, Vol. 32, No. 2, pp 1713-1721 (2009)
47. Elbing, B. R., Winkel, E. S., Lay, K. A., Ceccio, S. L., Dowling, D. R., and Perlin, M., "Bubble-Induced Skin-friction Drag Reduction and the Abrupt Transition to Air-layer Drag Reduction," *Journal of Fluid Mechanics*, Vol. 612, pp 201- 236 (2008)
48. Winkel, E. S., Elbing, B. R., Ceccio, S. L., Perlin, M., Dowling, D. R., "High-Reynolds-number turbulent-boundary-layer wall pressure fluctuations with skin friction reduction by gas injection," *Journal of the Acoustical Society of America*, Vol. 125, No. 5, pp 2522 - 2530 (2008)
49. Tortora, P. R., Ceccio, S. L., Mychkovsky, A.G., O'Hern, T. J., Torczynski, J. R., "Radial Profiles of Solids Loading and Flux in a Gas-Solid Circulating Fluidized Bed," *Powder Technology*, Vol. 180, No. 3, pp 312 - 320 (2007)
50. Sabra, K.G., Winkel, E. S., Bourgoyne, D. A., Elbing, B. R., Ceccio, S. L., Perlin, M., and Dowling, D. R., "On using cross correlations of turbulent flow-induced ambient vibrations to estimate the structural impulse response. Application to structural health monitoring," *Journal of the Acoustical Society of America*, Vol. 121, No. 4, pp 1987 - 1995 (2007)
51. Chang, N.A., Yakushiji, R., Dowling, D. R., and Ceccio, S. L., "Cavitation visualization of vorticity bridging during the merger of co-rotating line vortices," *Physics of Fluids*, Vol. 19, Art. No. 058106, pp 1 - 3 (2007)
52. Choi, J. and Ceccio, S. L., "Dynamics and Noise Emission from Vortex Cavitation Bubbles," *Journal of Fluid Mechanics*, Vol. 575, pp 1 - 26 (2007)
53. Kunz, R. F., Gibeling, H. J., Maxey, M. R., Tryggvason, G., Fontaine, A. A., Petrie, H. L., and Ceccio, S. L., "Validation of Two-Fluid Eulerian CFD Modeling for Microbubble Drag Reduction across a Wide Range of Reynolds Numbers," *Journal of Fluids Engineering*, Vol. 129, No. 1, pp 66-79 (2007)
54. Vanapalli, S. A., Ceccio, S. L., and Solomon, M. J., "Universal scaling for polymer chain scission in turbulence," *Proceedings of the National Academy of Science*, Vol. 103, No. 45, pp 16660-16665 (2006)

55. Tortora, P. R., Ceccio, S. L., O'Hern, T. J., Torczynski, J. R., and Trujillo, S. M. "Quantitative Measurement of Solids Distribution in Gas-Solid Riser Flows Using Electrical Impedance Tomography and Gamma Densitometry Tomography," *International Journal of Multiphase Flow*, Vol. 32, No. 8, pp 972-995 (2006)
56. Shen, X., Ceccio, S. L., and Perlin, M. "Influence of bubble size on micro-bubble drag reduction," *Experiments in Fluids*, Vol. 41, No. 3pp 415-424 (2006)
57. Oweis, G., Fry, D., Chesnakas, C. J., Jessup, S. D., and Ceccio, S. L., "Development of a Tip-Leakage Flow: Part 2- Comparison Between the Ducted and Un-ducted Rotor," *Journal of Fluids Engineering*, Vol. 128, pp 764-773 (2006)
58. Oweis, G., Fry, D., Chesnakas, C. J., Jessup, S. D., and Ceccio, S. L. "Development of a Tip-Leakage Flow: Part 1- The Flow Over a Range of Reynolds Numbers," *Journal of Fluids Engineering*, Vol. 128, pp 751-764 (2006)
59. Sanders, W. C., Winkel, E. S., Dowling, D. R., Perlin, M., and Ceccio, S. L. "Bubble Friction Drag Reduction in a High Reynolds Number Flat Plate Turbulent Boundary Layer," *Journal of Fluid Mechanics*, Vol. 552, pp 353-380 (2006)
60. Aphale, C. R., Cho, J., Schultz, W. W., Ceccio, S. L., Yoshioka, T., and Hiraki, H. "Modeling and Parametric Study of Torque in Open Clutch Plates," *Journal of Tribology*, Vol. 128, pp. 422-430 (2006)
61. Cho, J., Perlin, M., and Ceccio, S. L. "Measurement of near-wall stratified bubbly flows using electrical impedance," *Measurement Science and Technology*, Vol. 16, No. 4, pp. 1021-1029 (2005)
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106. Ceccio, S. L. and A. S. Wineman, "Influence of Electric Field Orientation on Shear Flow of Electrorheological Fluids," *Proc. of A. S. M. E. Fluids Engineering Conference*, A. S. M. E. FED 164, 21-27, Washington, D.C., (1993)
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Books:

M. Perlin and S. L. Ceccio, *Mitigation of Hydrodynamic Resistance: Methods to Reduce Hydrodynamic Drag*, World Scientific Publishing Company (2014)

Chapters in books:

Ceccio, S. L. and Mäkiharju, S. A. “Experimental Methods for the Study of Hydrodynamic Cavitation” in *C. I. S. M. Courses and Lectures- Cavitation Instabilities and Rotordynamic Effects in Turbopumps and Hydroturbines*, Ed. L. d'Agostino and M.V. Salvetti, Springer (2016)

Ceccio, S. L. “Cavitation”, and entry in *Multiphase Flow Handbook, 2nd Edition*, Ed. E. D. Michaelides, Taylor & Francis Group, (2015)

Oweis, G. F. and Ceccio, S. L. “Cavitation”, and entry in *Multiphase Flow Handbook, 1st Edition*, Ed. C. T. Crowe, Taylor & Francis Group, (2006)

Rothblum, R. S., Etter, R. J. and Ceccio, S. L., “Water Tunnel,” an entry in the *McGraw-Hill Encyclopedia of Science & Technology, 10th Edition*, McGraw-Hill, (2007)

Biancucci, B. and Ceccio, S. L., “Hear Valve Prostheses In Vitro Flow Dynamics,” *Encyclopedia of Medical Devices and Instrumentation*, Wiley (2006)

Oweis, G. and Ceccio, S. L., “Cavitation,” *Multiphase Flow Handbook*, CRC Press (2005)

Books edited:

Proceedings of CAV2009, edited by S. L. Ceccio (2009)

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Proceedings of the A.S.M.E. Symposium on Cavitation and Gas-Liquid Flow in Fluid Machinery and Devices, edited by S. L. Ceccio, A. Furukawa, and J. H. Kim, FED-Vol. 226, New York (1995)

Government, university or industrial reports (non-refereed):

1. Frechou D., Borusevich V., Ceccio S. L., Dinham-Peren T., Grabert R., Kim M. C., Korkut E., Ohmori T., and Yang C. J. "Propulsion Committee - Final Report and Recommendations to the 27th ITTC" (2014)
2. "Shipbuilding Engineering Education Consortium (SEEC)-Viability and Operational Concepts- final Report," Report to Naval Sea Systems Command by the National Shipbuilding Research Program (2009).
3. Tortora, P. R., Ceccio, S. L., Torczynski, J. R., "The Equivalent Mixture Permittivity of Dielectric-Particle Distributions," Report to Sandia National Laboratories, SAND2005-4648 (2005)
4. O'Hern, T. J. and Ceccio, S. L., "Validation Data for Models of Contaminant Dispersal: Scaling Laws and Data Needs," Report to Sandia National Laboratories, SAND2004-5220 (2004)
5. Zalek, S., R. Beck, S. L. Ceccio, A. Reed, "Drag Reduction For High Speed Ship Design," Report to the Office of Naval Research (2004)
6. Ceccio, S. L., Beck, R., Dowling, D. R., and Perlin, M., "Design of a High-Speed Friction Drag Reduction Experiment Using the William B. Morgan Large Cavitation Channel-Phase 2," Office of Naval Research (2004).
7. Ceccio, S. L., Beck, R., Dowling, D. R., and Perlin, M., "Design of a High-Speed Friction Drag Reduction Experiment Using the William B. Morgan Large Cavitation Channel-Phase 1," Office of Naval Research (2003).
8. Liter, S. G., Torczynski, J. R., Shollenberger, K. A., and Ceccio, S. L., "Electrical-Impedance Tomography for Opaque Multiphase Flows in Metallic (Electrically-

conducting) Vessels,” Report SAND2002-3834, Sandia National Laboratories, Albuquerque, NM (2002)

9. Ceccio, S. L., “Tracking and Remediation of Airborne Nuclear, Chemical, and Biological Threats,” Report to the Institute for Defense Analysis, (2002)
10. Billet, M. L., Atlar, M., Briançon-Marjollet, L., Ceccio, S. L., Kim, Y.-G., Oshima, A., Semionicheva, E., Song, I.-H., “The Specialist Committee on Water Quality and Cavitation- Final Report and Recommendations to the 23rd ITTC” (2002)
11. D. L. George, J. R. Torczynski, K. A. Shollenberger, T. J. O’Hern, and S. L. Ceccio, “Quantitative Tomographic Measurements of Opaque Multiphase Flows,” Report SAND2000-0443, Sandia National Laboratories, Albuquerque, NM (2000)
12. Ceccio, S. L., “Determination of Mixture Void Fractions Using Electrical Impedance Measurements- A report to General Motors Powertrain Division,” (1999)
13. Laberteaux, K. and S. L. Ceccio, “Performance Evaluation of a Centrifugal Blood Pump – A report to 3M-Sarns,” (1999)
14. Ceccio, S. L., “Electrostatic Cleaning of Hydraulic Fluid -A report to Hallock Hydraulic,” (1996)
15. Ceccio, S. L., “Observations of the dynamics and Acoustics of Traveling Bubble Cavitation,” Rep. No. ENG 249.11, California Institute of Technology (1990)

Patents

“Programmable Multi-Channel Amplitude and Phase Shifting Circuit,” K. W. Jones, C. Pierre, S. L. Ceccio, J. Judge, S. Fuchs, United States of America represented by the Secretary of the Air Force, June 2010, Patent Number 7,728,576 B1

Grants and Contracts:

Prof. Ceccio has been at the University of Michigan for 24 years, and over that time he has attracted externally funded research in the amount of \$32 Million as either a Principal Investigator (\$25 Million) or Co-Principal Investigator (\$7 Million). He has had over 25 collaborative investigators on these efforts.

Moreover, Prof. Ceccio directed the Naval Engineering Education Center with the support of NAVSEA, which as of FY2015 had devoted over \$25 Million for the development and recruitment of the next generation of naval engineers. This effort has supported over 45 faculty and their student teams around the country at over 22 academic institutions.

Individual projects are listed below:

1. "ACV Resistance, Propulsion, and Powering Parameter Setting Study and Technology Assessment," S. L. Ceccio (P.I.), M. Perlin (co-P.I.), and A. Troesch (co-P.I.) ONR, 4/1/16-9/30/16, \$246,920.
2. "Equipment for advanced simulations and experiments of bubble dynamics," E. Johnsen (P.I.), S. L. Ceccio (co-P. I.), S. Mäkiharju (co-P.I.) ONR, 6/1/15-6/1/16, \$249,328.
3. ABS - University of Michigan Research Program for Marine and Offshore Design Performance" S. L. Ceccio (P.I.), D. Karr (co-P.I.), M. Perlin (co-P.I.), K. Maki (co-P.I.), D. Singer (co-P.I.), J. Sun (co-P.I.), I. Kolmanovsky (co-P.I.), R. Eustice (co-P.I.), M. Johnson-Roberson (co-P.I.), 1/15 – 12/15, American Bureau of Shipping, \$795,517.
4. "Multi-Phase Leakage Flow Validation Data" S. L. Ceccio (P.I.) and S. A. Mäkiharju (co-P.I.), 9/1/14-10/31/16, DoE, Bettis Atomic Power Laboratory, \$416,750.
5. "Feasibility Study on High-Power Ultra-Fast X-Ray Tomography" S. A. Mäkiharju (P.I.), S.L. Ceccio (co-P.I.), 9/1/14- 8/31/14, DoE, Bettis Atomic Power Laboratory, \$149,608.
6. "Hosting Tomographic PIV Training" S. L. Ceccio (P.I.) and S. A. Mäkiharju (co-P.I.), 7/5/14-10/31/14, DoE, Bettis Atomic Power Laboratory, \$49,867.
7. "X-Ray Based Diagnostics For the Study of Sheet-to-Cloud Transition of Partial Cavities" S. L. Ceccio (P.I.), 5/1/14 – 4/30/17, Office of Naval Research, \$495,637.
8. "Non-intrusive Measurements of Oil Film Thickness between Operating-Gear Teeth" D. R. Dowling (P.I.) and S. L. Ceccio (co-P.I.), 1/14 – 12/14, General Electric Company, \$105,000.
9. "ABS - University of Michigan Research Center for Marine and Offshore Design Performance" S. L. Ceccio (P.I.), D. Karr (co-P.I.), M. Perlin (co-P.I.), K. Maki (co-P.I.), D. Singer (co-P.I.), J. Sun (co-P.I.), I. Kolmanovsky (co-P.I.), N. Vlahoupoulos (co-P.I.), R. Eustice (co-P.I.), M. Johnson-Roberson (co-P.I.), 9/13 – 12/14, American Bureau of Shipping, \$1,246,487 with additional \$75,000.
10. "Management of Microbubbles in Ship Wakes" S. L. Ceccio (P.I.), 9/17/11 – 2/28/14, Global Core Research Center- Pusan National University, \$219,106.
11. "MURI- Passive and Active Friction Drag Reduction of Turbulent Flows Over Super-Hydrophobic Surfaces" S. L. Ceccio (P.I.), Prof. M. Perlin (Co-P.I.), Prof. A. Tuteja (Co-P.I.), Prof. W. Choi (Co-P.I., University of Texas at Dallas), Prof. R. Cohen (Co-P.I., Massachusetts Institute of Technology), Prof. J. Katz (Co-P.I., Johns Hopkins University), Prof. K. Mahesh (Co-P.I., University of Minnesota), Prof. G. McKinley (Co-P.I., Massachusetts Institute of Technology), Prof. A. Mani (Co-P.I., Stanford University), 6/12 – 5/17, ONR, \$4,018,678.

12. "Experimental Investigation of Gearbox Lubrication", D. R. Dowling (P.I.), S. L. Ceccio (co-P.I.), and M. R. Hartman (co-P.I.), 5/11 – 4/13, General Electric Company, \$271,445.
13. "Experimental Examination of Inter-Channel Mixing Through a Narrow Gap", S. L. Ceccio (P.I.), 9/11 – 10/14, DoE, Bettis Atomic Power Laboratory, \$489,213.
14. "Experimental Investigation of Partial Cavitation and Its Transition to Cloud Cavitation", S. L. Ceccio (P.I.), 1/11 – 12/13, ONR, \$449,966.
15. "Air Lubrication Drag Reduction on Great Lakes Ships" S. L. Ceccio (P.I.), 10/16/10-10/15/11, Great Lakes Maritime Research Institute, \$25,000.
16. "Management of Ship-Wake Bubble Populations" S. L. Ceccio (P.I.), 7/1/10 – 9/30/13, ONR, \$479,543.
17. "Control of Tip-Vortex Cavitation Suppression and Gas Sheet Breakup (Supplement)," S. L. Ceccio (P.I.), 7/10 – 12/10, ONR, \$39,700.
18. "Establishment of a Naval Engineering Education Consortium" S. L. Ceccio (P.I.), (with 9 UM Co-Investigators and 15 subcontracting organizations), 4/1/10 – 9/30/15, NAVSEA, \$49,936,853 (Cost Ceiling on a Level of Effort Contract).
19. "STTR Phase II - Harvesting Hydrokinetic Energy Using Vortex Induced Vibration and Fish Biomimetics" S. L. Ceccio (P.I.), M. Bernitsas (co-P.I.), Vortex Hydro Energy, LLC, 9/1/10 – 8/31/12, \$149,999.
20. "Surface Effect Ship Bow Seal High Reynolds Number Experiment" S. F. Zalek (P.I.), S. L. Ceccio (co-P.I.), M. Perlin (co-P.I.), 10/09 – 9/11, ONR, \$1,680,689.
21. "Understanding of Lean Premixed Combustors from Cinema-Imaging of Turbulent Eddy-Flame Interactions" J. Driscoll (P.I.), S. L. Ceccio (co-P.I.), 8/09 – 7/12, NSF, \$311,806.
22. "A study of Horizontal Gas Jets in a Bubbling Fluidized Bed of Non-Spherical Particles," S. L. Ceccio (P.I.), J. S. Curtis (co-P.I. – U. Florida), 1/09 - 12/10, U.S. DoE, National Energy Technology Laboratory, \$315,219
23. "Experimental, Computational, and Design Tools for Turbomachinery Rotor Vibration," B. I. Epureanu (P.I.), S. L. Ceccio (co-P.I.), 4/05 – 6/10, General Electric Aviation, \$175,000.
24. "Measurement of Skin Friction From a Turbulent Boundary Layer For Various Surfaces and Coatings," S. L. Ceccio (P.I.), M. Perlin (co-P.I.), 11/08 – 12/09, ONR, \$137,562.

25. "Influence of Flow Perturbations on the Development and Maintenance of Air Layers," S. L. Ceccio (P.I.), D. Dowling (co-PI), and M. Perlin (co-P.I.), ONR, 1/08 – 6/09, ONR, \$2,026,579.
26. "Gas and Polymer Ingestion into a Water-Jet," S. L. Ceccio (P.I.) and M. Perlin (co-P.I.), 9/07 – 4/08, ONR, \$97,284.
27. "Design Tools for the Sea-Base-Connector Transformable Craft (T-Craft) Prototype Demonstrator," A. Troesch (P.I.), N. Vlahopoulos (co-P.I.), D. Carr (co-P.I.), S. L. Ceccio (co-P.I.), S. Zalek (co-P.I.), 4/07-12/08, ONR, \$867,581
28. "Testing of a Super-Hydrophobic Coating for Friction Drag Reduction," S. L. Ceccio (P.I.) 5/07 – 9/07, SeaShell Technology LLC (Phase 1b of ONR-STTR), \$9,000.
29. "Testing of a Super-Hydrophobic Coating for Friction Drag Reduction," S. L. Ceccio (P.I.) 1/07 – 4/07, SeaShell Technology LLC (Phase 1a of ONR-STTR), \$1,600.
30. "Control of Tip-Vortex Cavitation Suppression and Gas Sheet Breakup," S. L. Ceccio (P.I.), 1/07 – 12/09, ONR, \$555,331.
31. "Super-Hydrophobic Coatings for Friction Drag Reduction," M. Perlin (P.I.), S. L. Ceccio (co-P.I.), W. W. Schultz (co-P.I.): 5/06 – 4/07, Michigan Molecular Institute, (Phase 1a of ONR-STTR), \$21,019.
32. "Experimental, Computational, and Design Tools for Turbomachinery Rotor Vibration," M. P. Castenier (P.I.), S. L. Ceccio (co-P.I.), B. I. Epureanu (co-P.I.): 4/05 – 6/10, General Electric Aviation, \$885,000.
33. "Influence of Roughness on the Effectiveness and Persistence of Polymer Drag Reduction," S. L. Ceccio (P.I.), D. Dowling (co-P.I.), M. Perlin (co-P.I.), M. Solomon (co-P.I.), 4/06-12/07, DARPA, \$225,520.
34. "Evaluation of Air Cavity Lubrication at High Reynolds Numbers," S. L. Ceccio (P.I.), M. Perlin (co-P.I.), D. Dowling (co-P.I.), and W. Schultz (co-P.I.), 12/05 – 12/07, ONR, \$1,005,177.
35. "Evaluation Friction Drag Reduction Methods for Naval Applications," S. L. Ceccio (P.I.), A. Troesch (co-P.I.), 12/05 – 12/06, ONR, \$110,000.
36. "Microbubble and Polymer Drag Reduction at High Reynolds Numbers and Large Scales," S. L. Ceccio (P.I.), D. Dowling (co-P.I.), M. Perlin (co-P.I.), 8/05-12/05, ONR, \$60,557 (additional funding).
37. "High Reynolds Number Micro-bubble and Polymer Drag Reduction Experiments," S. L. Ceccio (P.I.), D. Dowling (co-P.I.), M. Perlin (co-P.I.), M. Solomon (co-P.I.), 9/03-11/06, DARPA, \$200,000 (additional funding).

38. "Cinema-PIV-PLIF system to Image the Dynamics of Supersonic Combusters," AFOSR, J. Driscoll (P. I.), S. L. Ceccio (co-P. I.), 5/04- 5/05, \$280,000
39. "Next-Generation Modeling, Analysis and Testing of the Vibration of Mistuned Bladed Disks," AFOSR, M. Castenier (P.I.), C. Pierre (co-P.I.), B. Epureanu (co-P.I.), S. L. Ceccio (co-P.I.), 3/04 – 12/06, \$288,352.
40. "High Reynolds Number Micro-bubble and Polymer Drag Reduction Experiments," S. L. Ceccio (P.I.), D. Dowling (co-P.I.), M. Perlin (co-P.I.), M. Solomon (co-P.I.), 9/03-11/06, DARPA, \$3,299,493.
41. "Modeling and Visualization of Clutch Performance: A Proposal to the Dynax Corporation." W. W. Schultz (P. I.), S. L. Ceccio (co-P. I.), Dynax Corp., 5/03 – 7/05, \$200,612
42. "Inception and Development of Vortex and Sheet Cavitation," S. L. Ceccio (P. I.), ONR, 3/03 - 3/06, \$420,066.
43. "Hydrodynamic Sound Source Localization System," D. Dowling (P. I.), S. L. Ceccio, (co-P.I.), ONR, 5/03 – 5/04, \$114,992
44. "Scanning Laser Vibrometry System for Mistuned Bladed Disk Vibration Diagnostics," C. Pierre (P. I.), S. L. Ceccio (co-P. I.) and M. Castanier (co-P. I.), AFOSR, 5/03 – 5/04, \$159,000.
45. "Design of a High-Speed Friction Drag Reduction Experiment Using the William B. Morgan Large Cavitation Channel," S. L. Ceccio (P.I.), D. Dowling (co-P.I.), M. Perlin (co-P.I.), R. Beck (co-P.I.), 5/03- 1/04, ONR, \$1,858,951.
46. "Microscopic mechanisms for skin friction reduction by microbubbles," Y. Kodoma (P.I.), Y. Murai (co-P.I.), S. L. Ceccio (co-P.I.) ONR-NICOP, 12/02 – 12/05, \$300,000
47. "Velocity and Microbubble Measurements-DURIP," S. L. Ceccio (P. I.) ONR, 6/1/02- 6/1/03, \$435,129
48. "Cinema-PIV Measurements of Turbulent Co-Flow Jets," J. Driscoll (P. I.), S. L. Ceccio (co-P. I.), NSF, 6/1/02-5/30/05, \$255,000,
49. "Dynamics and Acoustics of Trailing Edge Flows at High Reynolds Number", S. L. Ceccio (P. I.) and D. R. Dowling (co-P. I.), ONR, 9/01-12/02, \$35,000 (supplement)
50. "High Speed Ship Testing," R. Beck (P.I.), S. L. Ceccio (co-P.I.), ONR, 3/01-9/02, \$75,000

51. "Dynamics and Acoustics of Trailing Edge Flows at High Reynolds Number", S. L. Ceccio (P. I.) and D. R. Dowling (co-P. I.), ONR, 9/01-12/02, \$250,000 (supplement)
52. "Microbubble and Polymer Drag Reduction at High Reynolds Numbers and Large Scales" S. L. Ceccio (P. I.), D. R. Dowling (co-P. I.), M. Perlin (co-P. I.), DARPA/ONR, 3/01-12/04, \$2,718,693
53. "Dynamics of Turbulent Separated Shear Flows at High Reynolds Numbers" S. L. Ceccio (P. I.) and D. R. Dowling (co-P. I.), ONR, 2/99-1/02, \$120,000 (supplement)
54. "Experiment-based Development and Validation of Mistuning Models for Bladed Disks," C. Pierre (P. I.), S. L. Ceccio (co-P. I.) and M. Castanier (co-P. I.), AFOSR, 9/00 – 8/03, \$457,456
55. "Examination of the Dynamic Behavior of Solids Distribution in Recirculating Gas-Solid Riser Reactors using Electrical Impedance Tomography," S. L. Ceccio (P. I.), W. W. Schultz (co-P. I.), and R. Cocco (co-P. I.), NSF, 8/00 – 7/03, \$336,000
56. "Performance Testing of Blood Pumps," S. L. Ceccio (P.I.), Terumo Cardiovascular Systems, 1/00-12/00, \$75,000
57. "Simulation of Cavitating Flows Using FLUENT and STAR-CD," S. L. Ceccio (P. I.), Ford Motor Company, 3/00-12/00, \$30,624
58. "Computational Modeling of the Effect of Secondary Forces on the Phase Distribution in Dispersed Multiphase Flows," G. Tryggvason (P. I.) and S. L. Ceccio (co-P. I.), NASA, 5/00 – 11/03, \$360,000
59. "Development of an Electrical Impedance Tomography System for GDI," S. L. Ceccio (P. I.) and V. Sick, (co-P. I.), Daimler-Chrysler, 9/99 –8/01, \$203,205
60. "Fabrication of a Large Two-Dimensional hydrofoil for Flow Studies in the Large Cavitation Channel", S. L. Ceccio (P. I.) and D. R. Dowling (co-P. I.), ONR, 2/99-1/02, \$200,000
61. "Dynamics of Turbulent Separated Shear Flows at High Reynolds Numbers" S. L. Ceccio (P. I.) and D. R. Dowling (co-P. I.), ONR, 2/99-1/02, \$774,430
62. "Dynamics of Cavitation on Rotating Propulsors," S. L. Ceccio (P.I.), ONR, 5/99-4/02, \$1,683,461
63. "Performance Testing of Blood Pumps," S. L. Ceccio (P.I.), 3M-Sarns, 1/99-4/99, \$40,507
64. "An Electronic Speckle Pattern Interferometry System for the Study of Mistuned Bladed Disks," C. Pierre (P. I.) and S. L. Ceccio (co-P.I), AFOSR, 3/97-2/00, \$140,000

65. "Experimental-Based Development of Phenomenological Mistuning Models for Bladed Disks," C. Pierre (P. I.) and S. L. Ceccio (co-P.I.), AFOSR, 3/97-2/00, \$421,505
66. "Development of Electrical Impedance Tomography for the Characterization of Opaque Multiphase Flows," S. L. Ceccio (P.I.), DOE-SNL, 5/97-5/98, \$30,980
67. "Partial Cavitation on a 3-Dimensional Hydrofoil: Experimental and Numerical Studies-AASERT," ONR, 6/97-5/2000, \$100,000, S. L. Ceccio
68. "PIV Cinematography System for High Reynolds Number Multiphase Flows-DURIP," S. L. Ceccio (P.I.), ONR, \$139,000
69. "Liquid Metal Particle Deposition," S. L. Ceccio (P. I.) and G. Tryggvason (co- P. I.), NASA, 9/96-8/99, \$66,000
70. "Dynamics and Closure of Sheet Cavitation," S. L. Ceccio (P.I.), ONR, 10/95-9/98, \$375,000
71. "Characterization of Sprinkler Sprays and Their Interaction with Fire Induced Flows," A. Atreya (P.I.) and S. L. Ceccio (Co-P.I.), NIST, 9/95-8/98, \$309,735
72. "Fundamentals of Mold-Free Casting: Experiments and Computational Studies," S. L. Ceccio (P. I.) and G. Tryggvason (co- P. I.), NASA, 1/94-12/95, \$103,329
73. "Fluid Mechanics of Electrorheological Materials," S. L. Ceccio (P.I.), Rackham Fellowship, 1993, \$12,000
74. "HPIV Measurements in Cavitating Flows," S. L. Ceccio (P. I.) and L. Bernal. (co-P. I.), ONR, 10/92-9/95, \$173,239
75. "Experimental Study of Cavitation Transients and Boundary Layer Interactions," S. L. Ceccio (P.I.), ONR, 6/92 \$25,000 (supplement)
76. "Experimental Study of Cavitation Transients and Boundary Layer Interactions," S. L. Ceccio (P.I.), ONR, 6/91-5/94, \$228,372
77. "Large Scale Experiments on Cavitation Bubble Dynamics and Acoustics-AASERT Augmentation Award," S. L. Ceccio (P.I.), ONR, 9/92-10/95, \$227,401
78. "Large Scale Experiments on Cavitation Bubble Dynamics and Acoustics," S. L. Ceccio (P.I.), ONR, 1/91-12/92, \$118,949

SERVICE

Major Committee Assignments at U of M:

CoE Michigan Engineering Homecoming Brainstorm Committee 4/15
CoE MconneX Internal Advisory Committee, 9/11
Provost Tenure and Promotion Review Committee, 9/04 - 6/11, 6/13 - present
UM Interdisciplinary Faculty Hiring Program, Review Committee, 2/08 – 3/11 (Chair for 2010)
ME Faculty Search Committee, 8/07 – 6/09
UM Search Committee, Michigan Memorial Phoenix Energy Institute Director (Chair), 10/07 – 3/09
UM Graham Environmental Sustainability Institute, Executive Committee, 10/07 – 8/09
UM *Search and Discovery*, Member of the Editorial Board, 9/06 – 8/09
UM Space Utilization Initiative, 5/06 – 8/09
UM Michigan Memorial Phoenix Energy Institute, Executive Committee, 10/06 – 8/09
UM Michigan Energy Research Council, 9/05 – 8/09
UM Ford Nuclear Reactor Decommissioning Review Committee (Chair), 9/05 – 8/09
UM Phoenix Memorial Laboratory Renovation Programming Committee, 10/05 – 8/09
UM Nano-Science and Engineering Initiative Steering Committee (Chair), 2/05 - 8/09
Michigan Sea Grant Policy Committee, (Co-Chair), 9/04 - 8/09
Cooperative Institute for Limnology and Environmental Research, Executive Board, 9/04 - 8/09
UM Center For Statistical Consultation and Research, Executive Committee, 9/04 – 8/09
UM Transportation Research Institute, Steering Committee, 9/04 – 8/09
Hydrogen Research Committee, 9/04 – 9/05
ME SPARC Committee 10/03 – 9/04
UM Research Policies Committee 9/03 – 9/04
MEAM Planning Committee, 1/99 – 12/01
MEAM Advisory Committee, 9/99 – 12/01 (Recorder)
MEAM Safety Committee, 9/99- 12/01 (Chair)
MEAM Honors and Awards Committee, 3/98-12/98
CoE Teamwork Task Force, 3/97-12/98
MEAM Chair Search Committee, 12/97-6/98
MEAM Graduate Program Committee, 9/96- 9/99
MEAM Space Committee, 5/96-9/97
CoE Nomination Committee, 12/96-12/98
MEAM Undergraduate Instructional Laboratory Committee, 10/95-12/98 (Co-Chair)
MEAM Automotive Laboratory Renovation Committee 9/94 - 5/96
MEAM Departmental Seminar Series 9/94 - 5/96
MEAM Laboratory Committee, 1/93 - 9/97

Major Administrative Duties at U of M:

Chair, Naval Architecture and Marine Engineering, 7/11 - present
Director, Naval Engineering Education Center, 5/10 – 9/15
Associate Vice President for Research, 9/04 – 8/09
MEAM Associate Chair, 9/99 – 12/01

MEAM Graduate Program Chair, 1/99 – 9/99
Associate Director, Lay Automotive Laboratory, 5/96 - 12/98

Professional Society Memberships:

American Society of Mechanical Engineers
American Physical Society
Society of Naval Architects and Marine Engineers
American Society of Engineering Education

Professional Conference Organization:

Chair, Governing Board, International Symposium on Cavitation, 2015 - present
Vice Chair, Governing Board, International Conference on Multiphase Flow, 2013-2016
International Scientific Committee, International Conference on Multiphase Flow, ICMF
Jeju, Korea 2013
Scientific Committee, 8th International Symposium on Cavitation- CAV2012, Singapore, 2012
Scientific Committee, WIMRC 3rd International Cavitation Forum 2011, Warwick, 2011
International Scientific Committee, International Conference on Multiphase Flow, ICMF
Tampa 2010
Lead Organizer, 7th International Symposium on Cavitation- CAV2009, Ann Arbor, 2009
Scientific Committee, SuperFAST 2008, St. Petersburg, Russia, 2008
International Scientific Committee, International Conference on Multiphase Flow, ICMF
Lipzig 2007
Lead Organizer, University of Michigan Symposium on Energy Science, Technology, and
Policy, Ann Arbor, 2007
Scientific Committee, 6th International Symposium on Cavitation- CAV2006, Wageningen, 2006
Co-Organizer, A. S. M. E. Symposium on Microbubble and Polymer Friction Drag Reduction,
Houston, 2005
Co-Organizer, A. S. M. E. Cavitation and Multiphase Flow Forum, Houston, 2005
Organizing Committee, 2nd International Symposium on Seawater Drag Reduction, Busan, 2005
Organizing Committee, International Conference on Multiphase Flows, Yokohama, 2004
Lead Organizer, Joint U.S./Japan Workshop in Microbubble Drag Reduction, Maui, 2003
Scientific Committee, 5th International Symposium on Cavitation- CAV2003, Osaka, 2003
Lead Organizer, A. S. M. E.-JSME Symposium on Microbubble and Polymer Friction Drag
Reduction, Honolulu, 2003
Organizer, 4th International Symposium on Cavitation- CAV2001, Pasadena, 2001
Organizing Committee, 4th International Symposium on Multiphase Flows, New Orleans, 2001
Lead Organizer, A. S. M. E. Symposium on Multiphase Flows in Biomedical Applications and
Processes, Orlando, 2000
Lead Organizer, A. S. M. E. - J. S. M. E. Joint International Symposium on liquid-Solid Flows,
San Francisco, 1999
Co-Organizer, A. S. M. E. Symposium on the Measurement of Opaque Multiphase Flows,
Washington D. C., 1998

Co-Organizer, A. S. M. E. Symposium on Cavitation and Gas Liquid Flows in Fluid Machinery and Devices, San Diego, 1996
Co-Organizer, A. S. M. E. Symposium of Cavitation and Gas Liquid Flows in Fluid Machinery and Devices, Hilton Head, 1995
Organizing Committee, International Symposium on Cavitation, Deauville, France, 1995
Organizer, Office of Naval of Naval Research Workshop on Bubbly Flows, Ann Arbor, 1992

Professional Society Service:

Editorial Advisory Board, *International Journal of Multiphase Flow*, 2011- present
Member, ITTC Standing Committee on Propulsion, 2011 - present
Associate Technical Editor, *ASME Journal of Fluids Engineering* 2002-2005, 2006-2010
Member, Awards Committee, ASME Fluids Engineering Division, 2003- 2005
Panel Member, International Towing Tank Committee, 2000-2002
Chairman of the ASME Multiphase Flow Committee, 2000- 2002
Member, ITTC Specialist Committee on Water Quality and Cavitation, 1999 - 2002
Vice-Chairman of the ASME Multiphase Flow Committee, 1997- 2000
Member of Cavitation Committee of Office of Naval Research, 1992 – present
Member of ASME Multiphase Flow Committee, 1992 – present

Reviewer:

ASME Journal of Fluids Engineering
Journal of Fluid Mechanics
Physics of Fluids
Journal of Rheology
Experiments in Fluids
Journal of Computational Physics
Measurement Science and Technology
ASCE Journal
Mathematical Biosciences
International Journal of Multiphase Flow
Measurement Science and Technology
Journal of Ship Research
ASME Journal of Biomechanical Engineering
ASME Journal of Vibration and Acoustics
ASME Journal of Heat Transfer
ASME Journal of Engineering for Gas Turbines and Power
SNAME Journal
Journal of Applied Mathematical Modeling
Journal of the Society of Automotive Engineering
Computers and Fluids
Journal of Biomechanical Engineering
AIChE Journal
Flow Measurement and Instrumentation

Journal of Flow, Turbulence, and Combustion
Experimental Thermal and Fluid Science
Proceedings of the Royal Society
National Science Foundation
National Research Council
National Institutes of Health
Department of Energy
American Petroleum Institute
A. C. S. Petroleum Research Fund
Texas Higher Education Coordinating Board
Cambridge University Press
and others....

Consulting:

Praxair
American Steamship Company
BMW/Oracle Racing
Sandia National Laboratories
Texas Higher Education Coordinating Board
Institute for Defense Analysis
Oak Ridge National Laboratory
Terumo Corporation
General Motors Powertrain Division
Dickinson, Wright, Moon, VanDusen, and Freeman
Reid Crowther
Hallock Hydraulic
Difco Laboratories
General Dynamics-Land Systems Division
Georgia Institute of Technology
University of Southern California

Security Clearances:

U. S. Department of Defense- SECRET (Inactive)
U. S. Department of Energy- Q (Inactive)