

Mark Sussman
Christopher Hunter Professor of Mathematics
Resume of Research, Teaching, and Service (March, 2019)

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Professional Preparation

- 1989-1994 PhD, University of California, Los Angeles, Los Angeles, CA.
Major: Mathematics. Dissertation: A Level Set Approach for Computing Solutions to Incompressible Two-Phase Flow.
Dissertation supervisor: Stanley Osher.
- 1987-1989 MA, University of California, Los Angeles, Los Angeles, CA.
Major: Mathematics.
- 1983-1986 BS, San Diego State University, San Diego, CA.
Applied Mathematics, Physics and Computer Science.
Graduated summa cum laude.

Post-Degree Education and Training

- 1996-1999 Visiting Research Assistant Professor, University of California, Davis, Davis, CA. (mentor: Elbridge Gerry Puckett)
- 1994-1996 Post Doc, Lawrence Livermore National Laboratory, Livermore, CA.
(mentor: John Bell)

Professional Experience

- 2010-present Professor, Florida State University Mathematics
- 2016-present Associate, FSU Geophysical Fluid Dynamics Institute
- 2005-2010 Associate Professor, Florida State University Mathematics
- 1999-2005 Assistant Professor, Florida State University Mathematics
- 2018-2018 Consultant, Sandia National Laboratory (cavitation models in nozzles)
- 2011-2011 Consultant, Sandia National Laboratory (spray simulation methods)
- 2009-2011 Consultant, UTRC (spray simulation methods)
- 2007 Consultant, SAIC (Code enhancements to NFA)
- 1987-1992 Programmer, Unique Business Systems, Santa Monica, CA

Honors and Awards

1. Named Professor: Christopher Hunter Professor of Mathematics; three years starting September 26, 2018.
2. Computational Mechanics Achievement Award, The Japan Society of Mechanical Engineers, Computational Mechanics Division (2007).
3. Tannasawa Award (2015), for best ICLASS (International Conference on Liquid Atomization and Spray Systems) paper at Heidelberg conference: Arienti and Sussman, "Nozzle Geometry Effects on Primary Atomization." September, 2012.
4. Journal of Chemical Engineering Japan outstanding paper award: Ohta, Kimura, Furukawa, Yoshida, Sussman, "Numerical Simulations of a bubble rising through a shear-thickening fluid," 45(9), 2012.
<http://www.scej.org/jcej/outstanding.html>
5. Fluid and Particle Processing Award, the Society of Chemical Engineering, Japan (2003).

RESEARCH

Refereed Journal Articles (accepted or appeared)

1. M. Ohta, T. Furukawa, Y. Yoshida, **M. Sussman** (2019). A three-dimensional numerical study on the dynamics and deformation of a bubble rising in a hybrid Carreau and FENE-CR modeled polymeric liquid. *Journal of Non-Newtonian Fluid Mechanics*, 265, 66-78.
2. Chaoxu Pei, **M. Sussman**, and M. Yousuff Hussaini (2019). A Space-Time Discontinuous Galerkin Spectral Element Method for Nonlinear Hyperbolic Problems. *International Journal of Computational Methods*, 16(1), 1850093.
3. Chaoxu Pei, **M. Sussman**, and M. Yousuff Hussaini (2019). New Multi-implicit Space-Time Spectral Element Methods for Advection-Diffusion-Reaction Problems. *Journal of Scientific Computing*, 78(2), 653-686.
4. Chaoxu Pei, **M. Sussman**, and M. Yousuff Hussaini (2018). A Space-Time Discontinuous Galerkin Spectral Element Method for the Stefan problem. *Discrete and Continuous Dynamical Systems Series B*, 23.9: 3595-3622.
5. M. Arienti and **M. Sussman** (2017). A Numerical Study of the Thermal Transient in High-Pressure Diesel Injection. *International Journal of Multiphase flow*, volume 88, pages 205-221.
6. Y. Guo, Y. Lian, **M. Sussman** (2016). Investigation of drop impact on dry and wet surfaces with consideration of surrounding air. *Physics of Fluids (1994-present)*, 28(7), pp. 073303 (2016).
7. K. Yokoi, R. Onishi, X.-L. Deng, **M. Sussman** (2016). Density-scaled balanced continuum surface force model with a level set based curvature interpolation technique. *International Journal of Computational Methods*, 1641004 (2016).
8. G. Li, Y. Lian, Y. Guo, M. Jemison, **M. Sussman**, T. Helms, M. Arienti (2015). Incompressible Multiphase flow and encapsulation simulations using the moment of fluid method. *International Journal for Numerical Methods in Fluids*, 79(9), pages 456-490 (2015).
9. M. Jemison, **M. Sussman**, M. Shashkov (2015). Filament capturing with the multimaterial Moment-of-Fluid method. *Journal of Computational Physics*, 285, pages 149-172 (2015).

10. M. Jemison, **M. Sussman**, M. Arienti (2014). Compressible, multi-phase semi-implicit method with moment of fluid interface representation. *Journal of Computational Physics*, 279, pages 182-217 (2014).
11. M. Ohta, Y. Akama, Y. Yoshida, and **M. Sussman** (2014). Influence of the viscosity ratio on drop dynamics and breakup for a drop rising in an immiscible low-viscosity liquid. *Journal of Fluid Mechanics*, 752, pages 383-409 (2014).
12. M. Arienti and **M. Sussman** (2014). An Embedded Level Set Method for Sharp-Interface Multiphase Simulations of Diesel Injectors. *International Journal of Multiphase Flow*, 59, pages 1-14 (2014).
13. M. Jemison, E. Loch, **M. Sussman**, M. Shashkov, M. Arienti, Y. Wang, M. Ohta (2013). A coupled level set-moment of fluid method for incompressible two phase flow. *Journal of Scientific Computing*, 54(2-3), pages 454-491 (2013).
14. M. Arienti, X. Li, M. Soteriou, C. Eckett, **M. Sussman**, and B. Jensen (2013). Coupled Level-Set/Volume-of-Fluid Method for simulation of Injector Atomization. *Journal of Propulsion and Power*, 29(1), pages 147-157, DOI: 10.2514/1.B34198 (2013).
15. M. Ohta, S. Kimura, T. Furukawa, Y. Yoshida, and **M. Sussman** (2012). Numerical Simulations of a bubble rising through a shear-thickening fluid. *Journal of Chemical Engineering of Japan*, 45(9), pages 713-720 (2012).
16. M. Ohta and **M. Sussman** (2012). The buoyancy-driven motion of a single skirted bubble or drop rising through a viscous liquid. *Physics of Fluids*, 24(11), 112101 (18 pages) (2012).
17. Y. Wang, S. Simakhina and **M. Sussman** (2012). A hybrid level set-volume constraint method for incompressible two-phase flow. *Journal of Computational Physics*, 231(19), pages 6438-6471 (2012).
18. M. Ohta, K. Hashimoto, K. Naito, Y. Matsuo, and **M. Sussman** (2012). Numerical Analysis of Gas-Liquid Bubble Flow in a Horizontal Rectangular Channel. *Journal of Chemical Engineering of Japan*, 45(2), pages 102-106 (2012) (short communication).
19. **M. Sussman** (2012). A method for overcoming the surface tension time step constraint in multiphase flows II. *International Journal for Numerical Methods in Fluids*, 68(11), pages 1343-1361 (2012)
20. M. Ohta, S. Kikuchi, Y. Yoshida, and **M. Sussman** (2011). Robust numerical analysis of the dynamic bubble formation process in a viscous

- liquid. *International Journal of Multiphase flow*, 37(9)(2011) 1059-1071.
21. M. Ohta, S. Yamaguchi, Y. Yoshida, and **M. Sussman** (2010). The sensitivity of drop motion due to the density and viscosity ratio. *Physics of Fluids*, 22(7), pages 072102-1 to 072102-11 (11 pages) (2010).
 22. M. Ohta, Y. Yoshida, and **M. Sussman** (2010). A computational study of dynamic processes of a bubble rising in Carreau model fluids. *Fluid Dynamics Research*, 42(2), pages 025501-1 to 025501-15 (2010).
 23. M. Ohta, K. Onodera, Y. Yoshida, and **M. Sussman** (2009). Three-dimensional simulations of the dynamic motion of single drops rising in viscoelastic FENE-CR model fluids. *Journal of Chemical Engineering, Japan*, 42(10) 705-712 (2009).
 24. M. Ohta, Y. Akama, Y. Yoshida, and **M. Sussman** (2009). Three-dimensional simulation of the evolution process to vortex rings of falling drops in an immiscible viscous liquid. *Journal of Chemical Engineering, Japan*, 42(9), 648-655 (2009).
 25. **M. Sussman** and M. Ohta. (2009). A stable and efficient method for treating surface tension in incompressible two-phase flow. *SIAM Journal on Scientific Computing*, 31(4), 2447-2471 (2009).
 26. V. Mihalef, D. Metaxas, and **M. Sussman**. (2009). Simulation of two-phase flow with sub-scale droplet and bubble effects. *Comput. Graph. Forum*, 28(2), 229-238 (2009).
 27. S. Kadioglu and **M. Sussman**. (2008). Adaptive solution techniques for simulating underwater explosions and implosions. *Journal of Computational Physics*, 227, 2083-2104 (2008).
 28. P.A. Stewart, N. Lay, **M. Sussman**, and M. Ohta. (2008). An improved sharp interface method for viscoelastic and viscous two-phase flows. *Journal of Scientific Computing*, 35(1), 43-61.
 29. M. Ohta, M. Tsuji, Y. Yoshida, and **M. Sussman**. (2008). The transient dynamics of a small bubble rising in a low morton number regime. *Chemical Engineering Technology*, 31(9), 1-9.
 30. M. Ohta, D. Kikuchi, Y. Yoshida, and **M. Sussman**. (2007). Direct numerical simulation of the slow formation process of single bubbles in a viscous liquid. *Journal of Chemical Engineering, Japan*, 40, 939-943.
 31. **M. Sussman** and M. Ohta. (2007). Improvements for calculating two-phase bubble and drop motion using an adaptive sharp interface method. *Fluid Dynamics and Materials Processing*, 3(1), 21-36.

32. V. Mihalef, D. Metaxas, and **M. Sussman**. (2007). Textured Liquids based on the Marker Level Set. *Comput. Graph. Forum*, 26, 457-466.
33. V. Mihalef, S. Kadioglu, **M. Sussman**, D. Metaxas, and V. Hurmutsiadis. (2007). Interaction of multiphase flow with animated models. *Graphical Models*, 70, 33-42.
34. **M. Sussman**, K.M. Smith, M.Y. Hussaini, M. Ohta and R. Zhi-Wei. (2007). A sharp interface method for incompressible two-phase flows. *Journal of Computational Physics*, 221(2), 469-505.
35. A. VanderWyst, A. Christlieb, I.D. Boyd, and **M. Sussman**. (2007). Simulation of liquid metal droplets from field emission. *Communications in Computational Physics*, 2(4), 640-661.
36. H. Touil, M.Y. Hussaini, and **M. Sussman**. (2007). Tracking discontinuities in hyperbolic conservation laws with spectral accuracy. *Journal of Computational Physics*, 225(2), 1810-1826.
37. M. Ohta, M. Yoshida, and **M. Sussman**. (2006). Three-dimensional computations of the motion of a newtonian drop rising through immiscible quiescent shear-thinning liquids. *Journal of Chemical Engineering, Japan*, 39(4), 394-400.
38. E. Jimenez, **M. Sussman**, and M. Ohta. (2005). A computational study of bubble motion in newtonian and viscoelastic fluids. *Fluid Dynamics and Materials Processing*, 1(2), 97-108.
39. S. Kadioglu, **M. Sussman**, S. Osher, J.P. Wright, and M. Kang. (2005). A second order primitive preconditioner for solving all speed multi-phase flows. *Journal of Computational Physics*, 209(2), 477-503.
40. M. Ohta, S. Haranaka, Y. Yoshida and **M. Sussman**. (2005). Three-dimensional Numerical Simulations of the effect of initial bubble conditions on the motion of a bubble rising in viscous liquids. *Journal Chemical Engineering (Japan)*, 38(11), 878-882.
41. M. Ohta, T. Imura, Y. Yoshida and **M. Sussman**. (2005). A Computational Study of the effect of initial bubble conditions on the motion of a gas bubble rising in viscous liquids. *International Journal of Multiphase Flow*, 31(2), 223-237.
42. **M. Sussman**. (2005). A Parallelized, Adaptive algorithm for multi-phase flows in general geometries. *International Journal of Computers and Structures*, 83, 435-444.
43. M. Ohta, S. Haranaka, Y. Yoshida and **M. Sussman**. (2004). Three-dimensional Numerical Simulations of the motion of a gas bubble rising

in viscous liquids. *Journal Chemical Engineering (Japan)*, 37(8), 968-975.

44. **M. Sussman** and M.Y. Hussaini. (2003). A Discontinuous Spectral Element Method for the Level Set equation. *J. Scientific Computing*, 19, 479-500.
45. **M. Sussman**. (2003). A second order Coupled Level Set and Volume-of-Fluid Method for computing growth and collapse of vapor bubbles. *Journal of Computational Physics*, 187, 110-136.
46. **M. Sussman** and E.G. Puckett. (2000). A Coupled Level Set Volume of Fluid Method for computing 3d and axisymmetric Incompressible two-phase flows. *Journal of Computational Physics*, 162, 301-337.
47. **M. Sussman**, A. Almgren, J. Bell, P. Colella, L. Howell and M. Welcome. (1999). An Adaptive Level Set Approach for Incompressible Two-Phase Flows. *Journal of Computational Physics*, 148, 81-124.
48. **M. Sussman** and E. Fatemi. (1999). An Efficient, Interface Preserving Level Set Redistancing Algorithm and Its Application to Interfacial Incompressible Fluid Flow. *SIAM J. Sci. Comput*, 20(4), 1165-1191.
49. **M. Sussman**, E. Fatemi, P. Smereka and S. Osher. (1998). An Improved Level Set Method For Incompressible Two-Phase Flows. *Journal of Computers and Fluids*, 27(5-6), 663-680.
50. **M. Sussman** and P. Smereka. (1997). Axisymmetric Free Boundary Problems. *Journal of Fluid Mechanics*, 341, 269-294.
51. **M. Sussman**, P. Smereka, and S. Osher. (1994). A Level Set Approach for Computing Solutions to Incompressible Two-Phase Flow. *Journal of Computational Physics*, 114, 146-159.

Refereed Book Chapters

1. **M. Sussman** and M. Ohta. (2007). High-order techniques for calculating surface tension forces. *International Series of Numerical Mathematics*. In I. Figueiredo, J. Rodrigues, and L. Santos (Ed.), volume 154, Free Boundary Problems (pp. 425-434). Birkhauser Basel.

Invited Book Chapters

1. G. Tryggvason, **M. Sussman** and M.Y. Hussaini. (2007). Immersed boundary methods for fluid interfaces. In A. Prosperetti and G. Tryggvason (Ed.), *Computational Methods for Multiphase Flow* (pp. 37-77). Cambridge : Cambridge University Press.

2. **M. Sussman**. (2000). An adaptive mesh algorithm for free surface flows in general geometries. In A. Vande Wouwer, P.H. Saucez, and W.E. Scheisser (Ed.), *Adaptive Method of Lines* (pp. 207-231). Chapman and Hall/CRC Press.

Refereed Proceedings

1. M. Vahab, K. Shoele, and **M. Sussman** (2018). Interaction of an Oscillating Flexible Plate and Nucleate Pool Boiling Vapor Bubble: Fluid-Structure Interaction in a Multimaterial Multiphase System. In: 2018 Fluid Dynamics Conference, AIAA AVIATION Forum, (AIAA 2018-3718)
<https://doi.org/10.2514/6.2018-3718>
2. Y. Lian, D. Liao, H. Qiu, **M. Sussman**, M. Vahab, and M.Y. Hussaini (2017). Experimental and Numerical Investigation of Icing Process of a Liquid Droplet. In: 9th AIAA Atmospheric and Space Environments Conference 2017 (p. 4481). (AIAA 2017-4481).
<https://doi.org/10.2514/6.2017-4481>
3. M. Vahab, C. Pei, M.Y. Hussaini, **M. Sussman**, and Y. Lian (2016). An adaptive coupled level set and moment-of-fluid method for simulating droplet impact and solidification on solid surfaces with application to aircraft icing. In: 54th AIAA Aerospace Sciences Meeting 2016 (p. 1340). San Diego, California.
4. M. Arienti, **M. Sussman** (2015). A high fidelity study of high pressure diesel injection. In: JSAE 20159137 (SAE 2015-01-1853).
5. M. Ohta, Y. Akama, Y. Yoshida, and **M. Sussman**. (2009). The Unstable Dynamics of Single Drops Rising in Immiscible Viscous Fluids. In: Proc. of the 8th World Congress of Chemical Engineering (WCCE8) (10 pages). Montreal, Quebec, Canada.
6. V. Mihalef, D. Metaxas, **M. Sussman**, and L. Axel. (2009). Atrioventricular blood flow simulation based on patient-specific data. In: N. Ayache, H. Delingette, and M. Sermesant (Ed.), *Proceedings of the 2009 Fifth international conference on functional imaging and modeling of the heart, lecture notes in computer science proceedings* (10 pages). Nice, France: Springer.
7. V. Mihalef, B. Unlusu, D. Metaxas, **M. Sussman** and M.Y. Hussaini. (2006). Physics-based boiling simulation. In M.-P. Cani and J. O'Brien (Ed.), *Proceedings of the 2006 ACM SIGGRAPH/Eurographics symposium on Computer Animation* (pp. 317-324). Vienna Austria: Eurographics Association.

8. V. Mihalef, **M. Sussman**, and D. Metaxas. (2004). Animation and control of breaking waves. In R. Boulic and D. Pai (Ed.), Proceedings of the 2004 ACM SIGGRAPH/Eurographics symposium on Computer Animation (pp. 315-324). Grenoble, France: Eurographics Association.

Non-Refereed Journal Articles

1. **M. Sussman**. (2001). Computing droplet break-up using an adaptive coupled level set/volume-of-fluid method for incompressible two-phase flow in general geometries. *CFD Journal*, 9(1), 582-593.

Non-Refereed Proceedings

1. M. Ohta, H. Ryohei, T. Yozo, **M. Sussman** (2015). Numerical Simulation of Bubble Deformation and Breakup in Simple Shear Flow. In: Proceedings of The 16th International Conference on Fluid Flow Technologies (CMFF'15), Budapest, Sep. 2015.
2. Y. Lian, Y. Guo, G. Li, **M. Sussman** (2014). Multiphase flow simulation using the moment of fluid method. In: Proceedings of the Eight International Conference on Computational Fluid Dynamics (ICCFD8). Chengdu, China, July 14-18, 2014 (ICCFD8-0162).
3. M. Arienti, **M. Sussman** (2012). Nozzle geometry Effects on primary atomization. In: ICLASS 2012, 12th triennial international conference on liquid atomization and spray systems, Heidelberg, Germany, September, 2012.
4. M. Ohta, K. Onodera, Y. Yoshida, **M. Sussman** (2008). Three-Dimensional Numerical Simulations of a Rising Bubble in a Viscoelastic FENE-CR Model Fluid. In: AIP Conference Proceedings: Materials Physics and Applications, 1027. The 15th International Congress on Rheology (896-898). Monterey, CA, USA.
5. D.G. Dommermuth, T.T. O'Shea, D. Wyatt, **M. Sussman**, G. Weymouth, D. Yue, P. Adams, R. Hand. (2006). The numerical simulation of ship waves using cartesian-grid and volume-of-fluid methods. In Proceedings of the twenty-sixth symposium on naval hydrodynamics (17 pages). Rome, Italy: Strategic Analysis.
6. M. Ohta, Y. Yoshida, **M. Sussman**. (2004). Three-Dimensional Numerical Simulations of a Drop Rising in Shear-Thinning Fluid Systems. In Proc. of the 14th International Congress on Rheology, CD-ROM, NF35, Seoul, August 22-27.

7. D.G. Dommermuth, **M. Sussman**, R. Beck, T.T. O’Shea, and D. Wyatt. (2004). The numerical simulation of ship waves using Cartesian grid methods with adaptive mesh refinement. In Proceedings of the twenty-fifth symposium on naval hydrodynamics (13 pages). St. John’s, Newfoundland and Labrador, Canada: National Academies Press.
8. D.G. Dommermuth and **M. Sussman** (2000). The numerical simulation of ship waves using cartesian grid methods. In Proceedings of the twenty-third symposium on naval hydrodynamics (18 pages). Val-De-Reuil, France: National Academies Press.
9. I. Aleinov, E.G. Puckett, and **M. Sussman** (1999). Formation of droplets in microscale jetting devices. In: proceedings of the 3rd ASME/JSME joint fluids engineering conference (6 pages). San Francisco, CA (= FEDSM99-7106).
10. P. Colella, D.T. Graves, D. Modiano, E.G. Puckett, and **M. Sussman** (1999). An embedded boundary/volume of fluid method for free surface flows in irregular geometries. In: proceedings of the 3rd ASME/JSME joint fluids engineering conference (6 pages). San Francisco, CA (= FEDSM99-7108).
11. D. Marcus, **M. Sussman**, and D. Chambers (1995). Relaxation spectra of surface waves. In Proceedings of the 1995 International Mechanical Engineering Congress and Exposition (10 pages). Reno, NV.

Non-Refereed Reports

1. A. Duffy, A. Kuhnle and **M. Sussman** (2011). An Improved Variable Density Pressure Projection Solver for Adaptive Meshes. preprint.
2. **M. Sussman** and S. Uto (1998). Computing Oil Spreading Underneath a sheet of ice (CAM report 98-32). Los Angeles, CA: UCLA, Computational and Applied Math.

Non-Refereed Reviews

1. **M. Sussman**. (2018). Review of “Parameter-Robust Numerical Scheme for Time-Dependent Singularly Perturbed Reaction-Diffusion Problem with Large Delay”: K. Bansal and K. Sharma, MathSciNet/Mathematical Reviews, MR 3 750 654 (review published 12-13-2018).
2. **M. Sussman**. (2018). Review of “Stagnation of Block GMRES and its relationship to Block FOM”: K. Soodhalter, MathSciNet/Mathematical Reviews, MR 3 661 664 (review published 4-16-2018).

3. **M. Sussman.** (2017). Review of “Hybrid compact-WENO finite difference scheme with conjugate Fourier shock detection algorithm for Hyperbolic conservation laws”: W-S Don, Z. Gao, P. Li, and X. Wen. MathSciNet/Mathematical Reviews, MR 3 465 427 (review published 3-30-2017).
4. **M. Sussman.** (2017). Review of “Discrete Analysis of Domain Decomposition Approaches for Mesh Generation via the Equidistribution Principle”: R. Haynes and F. Kwok. MathSciNet/Mathematical Reviews, MR 3 557 799 (review published 2017).
5. **M. Sussman.** (2016). Review of “A fast semi-implicit level set method for curvature dependent flows with an application to limit cycles extraction in dynamical systems”: G. You and S. Leung. MathSciNet/Mathematical Reviews, MR 3 371 559 (review published 2016).
6. **M. Sussman.** (2015). Review of “A computational realization of a semi-Lagrangian method for solving the advection equation”: A. Efremov, E. Karepova, V. Shaydurov, and A. Vyatkin. MathSciNet/Mathematical Reviews, MR 3 275 769 (review published 2015).
7. **M. Sussman.** (2013). Review of “Numerical solution of a model for turbulent diffusion”: E. Sousa. MathSciNet/Mathematical Reviews, MR 3 128 116 (review published 2015).
8. **M. Sussman.** (2014). Review of “Modified characteristic finite difference fractional step method for moving boundary value problem of nonlinear percolation system”: Y.-R. Yuan, C.-F. Li, T.-J. Sun, Y.X. Liu. MathSciNet/Mathematical Reviews, MR 3 088 638 (review published 2014).
9. **M. Sussman.** (2013). Review of “Calculation of cell face velocity of non-staggered grid system”: W. Li, B. Yu, X-R Wang, S-Y Sun. MathSciNet/Mathematical Reviews, MR 3 012 418 (review published 2013).
10. **M. Sussman.** (2013). Review of “Numerical Approximation of the Euler-Poisson-Boltzmann model in the Quasi-neutral Limit”: P. Degond, H. Liu, D. Savelief, M.H. Vignal. MathSciNet/Mathematical Reviews, MR 2 891 946 (review published 2013).
11. **M. Sussman.** (2012). Review of “Projection algorithms with correction”: N. Aurelian, C. Popa, and U. Rude. MathSciNet/Mathematical Reviews, MR 2 841 410 (2012m:65101).
12. **M. Sussman.** (2012). Review of “A method of projection of delta waves in a Godunov scheme and application to pressureless fluid dynamics”: M. Colombeau. MathSciNet/Mathematical Reviews, MR 2 745 266 (2012f:65124).

13. **M. Sussman.** (2011). Review of “Geometric Applications of the Split Bregman Method: Segmentation and Surface Reconstruction”: T. Goldstein, X. Bresson, and S. Osher. MathSciNet/Mathematical Reviews, MR 2 679 800 (2011k:65029).
14. **M. Sussman.** (2010). Review of “A kind of double regularized GMRES Methods”: J. Liu and G. He. MathSciNet/Mathematical Reviews, MR 2 588 757 (2011e:65048).
15. **M. Sussman.** (2010). Review of “Monotone finite volume schemes of nonequilibrium radiation diffusion equations on distorted meshes” : Z. Sheng, J. Yue, G. Yuan. MathSciNet/Mathematical Reviews, MR 2 520 305 (2010k:65178).
16. **M. Sussman.** (2009). Review of “Explicit Hybrid Finite Difference Schemes From Operator Splitting for Solving Korteweg De Vries Equations”: A. Koross, J. Bitok, M. Oduor, and O. Ongati. MathSciNet/Mathematical Reviews, MR 2 492 530 (2010b:65167).
17. **M. Sussman.** (2009). Review of “Direct methods and ADI-preconditioned Krylov subspace methods for generalized Lyapunov equations”: T. Damm. MathSciNet/Mathematical Reviews, MR 2 464 173 (2009j:65083).
18. **M. Sussman.** (2009). Review of “Preconditioned iterative solver on the coarsest level of a multi-grid method for high frequency time harmonic electromagnetic field analysis”: T. Iwashita, K. Yosui, M. Mori, E. Kobayashi. MathSciNet/Mathematical Reviews, MR 2 395 094 (2009f:65068).
19. **M. Sussman.** (2008). Review of “Energy properties preserving schemes for Burgers’ equations”: R. Anguelov, J.K. Djoko, J.M.-S. Lubuma. MathSciNet/Mathematical Reviews, MR 2 371 347 (2008k:65159).
20. **M. Sussman.** (2008). Review of “Convergence of Implicit Difference Methods for Parabolic Functional Differential Equations”: K. Kropielnicka. MathSciNet/Mathematical Reviews, MR 2 344 423 (2008g:65110).
21. **M. Sussman.** (2008). Review of “A study of numerical methods for the level set approach” : P.A. Gremaud, C.M. Kuster, Z. Li. MathSciNet/Mathematical Reviews, MR 2 322 452 (2008e:65246).

Invited Presentations

1. **M. Sussman.** (2018, May 29). Invited to give seminar in the department of mathematics, Zhejiang University “A hierarchical space-time spectral element method for simulating complex multiphase flows.”

2. **M. Sussman.** (2017, May 30-June 1). Invited presentation to give a keynote speech in “CFD 2017,” Norway:
<https://www.sintef.no/projectweb/cfd-2017/program/>
3. **M. Sussman.** (2016, July). Invited presentation to give a talk in the workshop on complex boundary and interface problems, CRM, Montreal.
4. **M. Sussman.** (2015, August). Invited presentation to give 3 talks at the Beijing Computational Science Research Center.
5. **M. Sussman.** (2014, September). Invited presentation to give a talk in the University of Florida, ChemE colloquium.
6. **M. Sussman.** (2014, March 25-27). Cartesian grid, level set and immersed boundary lecture series, Bordeaux.
7. **M. Sussman.** (2013, March). Invited presentation to give a talk in the FSU-DSC colloquium.
8. **M. Sussman.** (2012, October). Invited presentation to give a talk in the University of Louisville, ME colloquium.
9. **M. Sussman.** (2012, September). Invited presentation to give a talk in the 2012 Workshop on Advances in Computational Mathematics and Engineering (workshop in honor of M.Y. Hussaini).
10. **M. Sussman.** (2012, September). Invited presentation to give a talk in the FSU-FAMU engineering colloquium.
11. **M. Sussman.** (2012, July). Invited presentation to give a talk in the LANL colloquium.
12. **M. Sussman.** (2012, June). Plenary speaker at ICNMMF 2012, Penn State University.
13. **M. Sussman.** (2012, April). Invited presentation to give a talk in the CalTech math colloquium.
14. **M. Sussman.** (2012, March). Invited presentation to give a talk in the NJIT math colloquium.
15. **M. Sussman.** (2011, December). Invited presentation at workshop on transport processes on moving interfaces II. (Aachen, Germany).
16. **M. Sussman.** (2011, September). Invited presentation at workshop on transport processes on moving interfaces I. (Heidelberg, Germany).

17. **M. Sussman.** (2011, January). Invited lectures on interface tracking methods in the workshop “Frontier CFD for strongly nonlinear marine hydrodynamics.” (Harbin, China)
18. **M. Sussman.** (2010, April). Gave lectures on interface tracking methods in the workshop “INDAM intensive period on fluid dynamics.” (Catania, Italy)
19. **M. Sussman.** (2010, March). Japan SIAM (Tsukuba), The development of appropriate smoothers for multigrid when used as a preconditioner for CG.
20. **M. Sussman.** (2009, August). An adaptive multi-phase flow solver for coupled-ocean atmosphere modeling. Presentation at the workshop on free boundary/surface problems, Boulder, CO: NCAR.
21. **M. Sussman.** (2009, July). Overcoming the surface tension time step constraint when computing incompressible two-phase flows. Keynote presentation in R. Rao, D. Noble, and T. Baer (chairs), CFD for free and moving boundaries. Symposium conducted at the meeting of the USNCCM X, Columbus, Ohio.
22. **M. Sussman.** (2007, December). Adaptive level set methods for ship hydrodynamics. Keynote presentation at the Trondheim, Norway workshop, CFD solvers for unsteady marine applications, capabilities and challenges: Center for Ships and Ocean Structures.
23. **M. Sussman.** (2007, November). An adaptive multi-phase flow solver for incompressible viscous and visco-elastic flows. Presentation at SAMSI workshop on interfaces, Raleigh-Durham, NC: SAMSI.
24. **M. Sussman.** (2007, June). A scalable adaptive solver for simulating the break-up of a liquid jet in a cross-flow. Presentation at the workshop on atomization and spray, East Hartford, CT: United Technologies Research Corporation.
25. **M. Sussman.** (2007, May). An adaptive multi-phase flow solver for incompressible viscous and visco-elastic flows. Presentation at Frontiers in Applied and computation mathematics (FACM 07), Newark, New Jersey: New Jersey Institute of Technology.
26. **M. Sussman.** (2005, June). High order VOF height fraction techniques for extracting curvature from the VOF function. Presentation at conference on free boundary problems, Coimbra, Portugal: University of Coimbra.

27. **M. Sussman.** (2003, September). Adaptive level set methods for all-speed flows. Keynote presentation at the Brussels, Belgium, workshop on industrial challenges in the simulation of evolving interfaces: Mathematics, Computing, and Simulation for Industry (MACSINET) workshop, Vrije University.
28. **M. Sussman.** (2001, May). An adaptive level set method for ship waves and underwater explosions/implosions. Presentation at IPAM Workshop on Geometrically Based Motions in Image Processing, Computer Vision, and Computer Graphics. Los Angeles, CA: IPAM (UCLA).
29. **M. Sussman.** (2001, January). An adaptive level set method for simulating ink-jet devices. Presentation at IMA hot topics workshop: Analysis and modeling of industrial jetting processes. Minneapolis, Minnesota: IMA.

Contracts and Grants

1. Y. Lian, **M. Sussman**, NASA B - Verification and enhancement of a 3D nucleate pool boiling simulation model using PSI data. (2017-2018) 200K.
2. **M. Sussman**, M.Y. Hussaini. A spectrally accurate hybrid moment-of-fluid and level set method for multiphase flow. NSF DMS 350K (incremental 3 year grant August 2014-2017).
3. **M. Sussman**, M. Roper. Computational Design of microfluidic structures. NSF DMS 300K (incremental 3 year grant August 2010-2013).
4. **M. Sussman.** Acoustic cross-talk in jetting devices. Funded by Kodak. (2008). Total award: 5K
5. **M. Sussman**, G. Erlebacher, X. Wang, and D. Kopriva. SCREMS: High Performance Computing and Visualization. Funded by NSF. (2007). Total award: 115K
6. **M. Sussman.** A Computational study of the spray characteristics of a liquid jet atomized by cross-flowing air. Funded by NSF. (2007-2010). Total award: 322K
7. **M. Sussman.** Code enhancements to NFA. Funded by SAIC. (2007). Total award: 13K
8. **M. Sussman.** Numerical Modeling of underwater implosions. Funded by ONR. (2004-2006). FSU award: 55K

9. **M. Sussman.** U.S. Japan Cooperative Science: A computational study of bubble and drop dynamics in inelastic and viscoelastic non-Newtonian fluid systems. Funded by NSF. (2003-2007). Total award: 46K
10. **M. Sussman.** Advanced Fluid Modeling Capability for Underwater shock analysis of Naval Ships, Phase II, STTR grant together with Weidlinger corporation. Funded by ONR. (2002-2004). FSU award: 120K
11. **M. Sussman** and M.Y. Hussaini. Numerical methods for microscale and nanoscale multiphase flow in general geometries. Funded by NSF. (2001-2005). Total award: 100K
12. **M. Sussman.** Advanced Fluid Modeling Capability for Underwater shock analysis of Naval Ships, Phase I and Phase I option STTR grant together with Weidlinger corporation. Funded by ONR. (2001-2002). FSU award: 40K
13. **M. Sussman.** Numerical Modeling of vapor bubble creation and collapse in 3D general geometries. Funded by XEROX. (2000-2001). Total award: 10K
14. **M. Sussman.** First-Year Assistant Professor award. Funded by FSU. (2000). Total award: 10K
15. **M. Sussman,** E.G. Puckett, A. Edelson, A. Fannjiang, J. Gravner, D. Stuart. Mathematical Sciences Computing Research Environments. Funded by NSF. (1997). Total award: 40K
16. **M. Sussman** and E.G. Puckett. Efficient, High Resolution, Numerical Methods for Free-boundary Problems with Surface Tension. Funded by NSF. (1997-2001). Total award: 60K.

Host for Visiting Professors and graduate students

1. Professor Mitsuhiro Ohta, Summer 2002, 2003, 2004, 2005
2. Dr. Nikiforakis (Cambridge) for two days in January 2008.
3. Dr. Shin Rhee (S. Korea) for two days in 2008.
4. Dr. Kensuke Yokoi (Cambridge) for two days in 2008.
5. Professor Kuniyoshi Abe, January 2008 to June 2008.
6. Marcel Kwakkel (Netherlands), June 2010.

7. Valeria Artale (Sicily), November 2010.
8. Eva Loch (Germany), August-December 2011.
9. Liang Tao (CSRC, Beijing), 2017. (6 months)
10. Zhouteng Ye (Ocean Engr, Zhejiang Univ.), 2017-2018. (1 year)
11. Dr. Lian (Univ. Louisville, KY) for four days in November 2018.

TEACHING

Courses Taught: Calculus I, Calculus II, Linear Algebra, Advanced Calculus, Ordinary Differential Equations, Partial Differential Equations, Partial Differential Equations II, Engineering Math I, Engineering Math II, Numerical Analysis I, Numerical Analysis II, Numerical PDE I, Numerical PDE II, Foundations of Computational Math II, MAD6939: Numerical methods for deforming boundary problems, MAD6939: Adjoint methods for PDE constrained optimization problems.

Chair of Doctoral Dissertation Supervisory Committees

1. Samet Kadioglu, graduated PhD. (2005).
2. Edwin Jimenez, graduated PhD. (2009). (co-advisor)
3. Yaohong Wang, graduated PhD. (2010).
4. Svetlana Simakhina, graduated PhD. (2010).
5. Austen Duffy, graduated PhD. (2011). (co-advisor)
6. Xiao Chen, graduated PhD. (2011) (co-advisor)
7. Matthew Jemison, graduated PhD. (2014)
8. Chaoxu Pei, graduated PhD. (2017)
9. Omid Khanmohamadi, graduated PhD. (2017)
10. Matthew Villemarette
11. Feifan Liu
12. Yang Liu
13. Peng Diao
14. Jihua Chen
15. Cody Estebe
16. Antigoni Georgiadou

Member of Doctoral Dissertation Supervisory Committee: Aditya Nair (university representative, graduated July 2018), Philip Boehner (university representative, graduated July 2018), Ryan Learn (university representative, graduated July 2018), Yaqing You (graduated June 2018), Michael Schneier (university representative, graduated June 2018), Gitesh Dawer (graduated June 2018), Tao Liang (CSRC, Beijing, graduated May 2018), Eric Deem (university representative, graduated May 2018), Timothy Davis (graduated 2017), Melissa Marchand (graduated 2017), Wenju Zhao (university representative, graduated 2017), Kyle Pascioni (university representative, graduated 2017), Daniel Fenn (university representative, graduated 2016), Olmo Zavala Romero (university representative, graduated 2015), Daozhi Han (graduated 2015), Tim Handy (university representative, graduated 2014), Jiangbo Yuan (university representative, graduated 2014), Evan Bollig (university representative, graduated 2013), Anna McGregor (graduated 2010), Viorel Mihalef (graduated 2007), Mark Whidden (graduated 2013), David Shen (graduated), Cesar Acosta (graduated), Yan Yan He (graduated, 2013), Yaning Liu (graduated 2013), Anand Ganesan, Santha Ram Akella (graduated, 2006), Zhenlu Cui (graduated, 2005), Heaya Ann Summy (graduated, 2008)

Chair of Master's degree Committee

1. Ren Zhi-Wei (2003)
2. Hanbing Song (2012)
3. Shakti Bhattarai (2013)

Chair of Undergraduate Honors thesis Committees

1. Ben Goldsberry; thesis successfully defended April 2012.
2. Andrew McMillan; thesis successfully defended April 2017.
3. Jennifer Yarboro; thesis successfully defended April 2017.

Postdoctoral supervisor

1. Dr. Mehdi Vahab (co-advisor)

SERVICE

1. FSU Graduate Policy Sub-Committee Chair for committee that reports on the department of Electrical and Computer Engineering (Jan-Feb 2019).
2. elections committee Fall 2018
3. Hiring committee (2013, 2014, 2015, 2016).
4. Committee Member, University Faculty Sabbatical Committee, (2006-2007,2009-2010).
5. Member, Faculty Senate, (2008-2009).
6. Committee Member, Graduate Committee (2012, 2014-2019).
7. Committee Member, Math Faculty Evaluation Committee (FEC), (2014-2015).
8. Committee Member, Math Faculty Evaluation Committee (FEC), (2009-2011).
9. Committee Member, Math Faculty Evaluation Committee (FEC), (2006-2007).
10. Committee Member, Math Curriculum Committee, (2008-present?).
11. Scheduler, Applied Math Seminar, (2007-2010).
12. Committee Member, numerical analysis qualifying exams (2000-present).
13. Editorial Board Member (2005-present). Fluid Dynamics and Materials Processing.
14. Reviewer of submitted articles to: Journal of Computational Physics, Journal of Fluid Mechanics, Journal of Scientific Computing, Physics of Fluids, Fluid Dynamics and Materials Processing, Physical Review E, Physics Letters A, Methods and Applications of Analysis, Numerical Heat Transfer, Computers and Fluids, Theoretical and Computational Fluid Dynamics, Graphical Models, International Journal of Computational Fluid Dynamics, Journal of Computers and Structures, International Journal of Computers and Mathematics with applications, SIAM Journal of Scientific Computing, SIAM Journal on Numerical Analysis, ASME Journal of Fluids Engineering, CiSE Journal, Computer Methods in Applied Mechanics and Engineering (CMAME),

Computers and Mathematics with Applications (CAMWA), Biophysical Journal, Journal of Computational Mathematics, Siggraph 2007, 2013, Discrete and Continuous Dynamical Systems, European Journal of Mechanics-B/Fluids, European Physical Journal, Numerical Methods for Partial differential equations (NMPDE), International Journal of Multiphase Flow, ASME Journal of Heat Transfer, Applied Mathematics and Computation, Philosophical Transactions of the Royal Society, International Journal of Heat and Mass Transfer, Communications in Applied Mathematics and Computational Science (CAMCoS), Fluid Dynamics Research, Scientia Iranica, Communications in Computational Physics (CiCP), Journal of Aerospace Engineering, Proceedings of the IMechE Part C - Journal of Mechanical Engineering Science, AIAA Journal, Computing and Visualization in Science, SIAM Journal on multiscale modeling and simulation, International Journal for Numerical Methods in Fluids, International Communications in heat and mass transfer, Journal of Fluids (Hindawi), Journal of Soils and Foundations, WIREs Computational Statistics, IEEE Transactions on image processing, Computational Thermal Sciences, International Journal of Thermal Sciences, Chemical Engineering Science, special issue keynote articles from conference proceedings.

15. Review of grant applications submitted to: DOE, NSF, DFG, NSERC (Natural Sciences and Engineering Research Council of Canada), Netherlands Organization for scientific research, French National Research Agency (body of proposal in French), COST program (European Cooperation in Science and Technology), MOST (Ministry of Science Technology and Space, Israel), "FONDECYT" competition (CHILE).
16. Review of internal FSU CRC proposals.
17. Lead opponent for thesis defense of Karl Yngve Lervag, September, 2013. Norwegian Technical University.
18. Habilitation committee for Dr. Sebastien Tanguy, December 2015. Institute for Fluid Mechanics (IMFT), Toulouse.
19. Proposal panel participant: NSF, DOE, Deutsche Forschungsgemeinschaft (DFG, www.dfg.de), NIH.
20. Review of University promotion folders.
21. Reviewer of book proposals; most recent review for Taylor-Francis proposal "computational methods for interfacial flows."
22. ICNMMF Executive Organizing Committee (International Conference on Numerical Methods in Multiphase Flows) June 12-14 at Penn State University (2012).

23. Co-organizer of SIAM-SEAS mini-symposium, March 2014 (Melbourne, Florida) and March 2016 (Athens, Georgia).
24. Co-organizer SIAM mini-symposium, conference on scientific computing 2011, 2013, 2015.
25. Co-organizer SIAM mini-symposium, annual meeting July, 2001, 2010.
26. Co-organizer AMS mini-symposium, sectional meeting, 2004.
27. Vice President of Education, Seminole Toastmasters (2005-2009).

Membership in Professional Organizations: Society for Industrial Applied Mathematics (SIAM), American Physical Society (APS), American Institute of Aeronautics and Astronautics (AIAA).