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ACADEMIC POSITIONS

Department of Mechanical Engineering
University of Massachusetts Dartmouth

Associate Professor September 2016 – present

Assistant Professor September 2010 – August 2016

Brown University

Visiting Scholar January 2019 – May 2019

EDUCATION AND TRAINING

B.Sc. (University of Tehran, Department of Mechanical Engineering) 1998

M.A.Sc. (University of Toronto, Department of Mechanical and Industrial Engineering (MIE)) 2003

Ph.D. (University of Toronto, Department of MIE) 2008

Postdoctoral study (Stanford University) 2008-2010
NASA-Stanford University's Center for Turbulence Research (CTR)

TEACHING AND RESEARCH AWARDS

- *Milton van Dyke Award,* American Physical Society, Division of Fluid Dynamics (2020).
- *Industrial Research and Development Fellowship,* Government of Canada (2010).
- *Postdoctoral Fellowship*, NASA-Stanford University's Center for Turbulence Research (2008).
- *Early Career Teaching Award* for instructing a second-year undergraduate course on advanced engineering mathematics, University of Toronto, Dept. of MIE (2007).
- *CFD Society of Canada Graduate Scholarship* (2007).
- *Shaw Scholarship* (for top two students of the department), University of Toronto, Dept. of MIE (2006).
- *Ontario Graduate Scholarship,* Government of Ontario (2006).
- *Queen Elizabeth II Graduate Scholarship in Science and Technology (formerly Ontario Graduate Scholarship in Science and Technology / DuPont Canada Scholarship), Government of Ontario, University of Toronto, DuPont Canada (2005).*
- *Miller Scholarship*, University of Toronto, Dept. of MIE (2005).
- *University of Toronto Open Fellowship*, University of Toronto (2001-2006).

PUBLICATIONS

Book chapter

1. A. Sinkevich, S. Bhowmick, and **M. Raessi**, *Strategies for overcoming transport limitations of convective desiccation of trehalose solutions for ambient temperature preservation of biologics,* Multiscale Technologies for Cryomedicine - Implementation from Nano to Macroscale, Edited by Xiaoming He and John Bischof, World Scientific Publishing (2016).

Peer-reviewed journal papers

2. A. Pathak and **M. Raessi**, *An implicit, sharp numerical treatment of viscous terms at arbitrarily shaped liquid-gas interfaces in evaporative flows,* Journal of Computational Physics, 481, 109625 (2020).
3. D. Markt, A. Pathak, **M. Raessi**, S.-Y. Lee, and R. Torelli, *Computational characterization of the secondary droplets formed during the impingement of a train of ethanol drops*, International Journal of Engine Research, 21, 248-262 (2020).
4. R. Torelli, R. Scarcelli, S. Som, X. Zhu, S.-Y. Lee, J. Naber, D. Markt, and **M. Raessi**, *Towards predictive and computationally affordable Lagrangian-Eulerian modeling of spray-wall interaction*, International Journal of Engine Research, 21, 263-280 (2020).
5. K. Senol and **M. Raessi**, *Enhancing power extraction in bottom-hinged flap-type wave energy converters through advanced power take-off techniques*, Ocean Engineering Vol. 182, pp. 248–258 (2019).
6. A. Pathak and **M. Raessi**, *Steady-state and transient solutions to drop evaporation in a finite domain: Alternative benchmarks to the* d^2 *law,* International Journal of Heat and Mass Transfer, Vol. 127, pp. 1147–1158 (2018).
7. D. Markt, A. Pathak, and **M. Raessi**, *Advanced computational simulations of surface inpingement of a train of ethanol drops – A pathway to developing spray-wall interaction sub-models*, Computing in Science and Engineering, Vol. 20, pp. 55-65 (2018).
8. A. Pathak, C. Freniere, and **M. Raessi**, *Advanced computational simulations of water waves interacting with wave energy converters,* European Journal of Computational Mechanics, Vol. 26, pp. 172–204 (2017).
9. B. Amirzadeh, A Louhghalam, **M. Raessi**, and M. Tootkaboni, *A computational framework for the analysis of rain-induced erosion in wind turbine blades, Part I: Stochastic rain texture model and drop impact simulations,* Journal of Wind Engineering and Industrial Aerodynamics, Vol. 163, pp. 33-43 (2017).
10. B. Amirzadeh, A Louhghalam, **M. Raessi**, and M. Tootkaboni, *A computational framework for the analysis of rain-induced erosion in wind turbine blades, Part II: Drop impact-induced stresses and blade coating fatigue life*, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 163, pp. 44-54 (2017).
11. A. Pathak and **M. Raessi**, *A three-dimensional volume-of-fluid method for reconstructing and advecting three-material interfaces forming contact lines,* Journal of Computational Physics, Vol. 307, pp. 550–573 (2016).
12. A. Pathak and **M. Raessi**, *A 3D, fully Eulerian, VOF-based solver to study the interaction between two fluids and moving rigid bodies using the fictitious domain method*, Journal of Computational Physics, Vol. 311, pp. 87-113 (2016).
13. C. Freniere, A. Pathak, **M. Raessi**, and G. Khanna, *Feasibility of Amazon's Cloud Computing Platform for Parallel GPU-Accelerated Multiphase Flow Simulations,* Computing in Science and Engineering Vol. 18, pp. 68-77 (2016).
14. A. Ghasemi, A. Pathak, and **M. Raessi**, *Computational simulation of the interactions between moving rigid bodies and incompressible two-fluid flows*, Computers and Fluids, Vol. 94, pp. 1-13 (2014).

15. L. R. Berard, **M. Raessi**, M. T. Bauer, P. D. Friedman, and S. Codyer, *An investigation on the breakup of underwater buoyant oil jets: computational simulations and experiments*, Atomization and Sprays Vol. 23, pp. 981-1000 (2013).
16. A. Amirzadeh Goghari, **M. Raessi**, and S. Chandra, *Producing molten metal droplets smaller than the nozzle diameter using a pneumatic drop-on-demand generator*, Experimental Thermal and Fluid Science Vol. 47, pp. 26–33 (2013).
17. P. D. Friedman, S. Carey and **M. Raessi**, *Influence of volatile degassing on initial flow structure and entrainment during undersea volcanic fire fountaining eruptions*, Natural Science, Vol.4, No.12, 1002-1012 (2012).
18. **M. Raessi** and H. Pitsch, *Consistent mass and momentum transport for simulating incompressible interfacial flows with large density ratios using the level set method*, Computers and Fluids, Vol. 63, pp. 70-81 (2012).
19. **M. Raessi**, J. Mostaghimi, and M. Bussmann, *A volume-of-fluid interfacial flow solver with advected normals*, Computers and Fluids, Vol. 39, pp. 1401-1410 (2010).
20. K. Shinoda, **M. Raessi**, J. Mostaghimi, T. Yoshida, and H. Murakami, *Effect of substrate concave pattern on splat formation of Yttria-stabilized Zirconia in atmospheric plasma spraying*, Journal of Thermal Spray Technology, Vol. 18, pp. 609-618 (2009).
21. **M. Raessi**, M. Bussmann, and J. Mostaghimi, *A semi-implicit finite volume implementation of the CSF method for treating surface tension in interfacial flows*, International Journal for Numerical Methods in Fluids, Vol. 59, pp. 1093-110 (2009).
22. I.V. Roisman, L. Opfer, C. Tropea, **M. Raessi**, J. Mostaghimi, and S. Chandra, *Drop impact onto a dry surface: role of the dynamic contact angle*, Colloids and Surfaces A, Vol. 322, pp. 183-191 (2008).
23. **M. Raessi**, J. Mostaghimi, and M. Bussmann, *Advecting normal vectors: a new method for calculating interface normals and curvatures when modeling two-phase flows*, Journal of Computational Physics, Vol. 226, pp. 774-797 (2007).
24. H.R. Salimijazi, **M. Raessi**, J. Mostaghimi, and T.W. Coyle, *Study of solidification behavior and splat morphology of vacuum plasma sprayed Ti alloy by computational modeling and experimental observations*, Surface and Coatings Technology, Vol. 201, pp. 7924-7931 (2007).
25. **M. Raessi**, J. Mostaghimi, and M. Bussmann, *Effect of surface roughness on splat shapes in the plasma spray coating process*, Thin Solid Films, Vol. 506-507, pp. 133-135 (2006).
26. **M. Raessi** and J. Mostaghimi, *Three-dimensional modeling of density variation due to phase change in complex free surface flows*, Numerical Heat Transfer, Part B: Fundamentals, Vol. 47, pp. 507-531 (2005).
27. N.Z. Mehdizadeh, **M. Raessi**, S. Chandra, and J. Mostaghimi, *Effect of substrate temperature on splashing of molten tin droplets*, ASME Journal of Heat Transfer, Vol. 126, pp. 445-452 (2004).

Peer-reviewed technical/conference papers:

28. J. Zhai, N. Ahuja, L. Zhao, X. Zhu, J. Naber, and S.-Y Lee, D. Markt, **M. Raessi** and R. Torelli, *An Analytical Energy-budget Model for Diesel Droplet Impingement on an Inclined Solid Wall*, SAE Technical Paper 2020-01-1158, doi:10.4271/2020-01-1158 (2020).
29. D. Markt, A. Pathak, **M. Raessi**, S.-Y. Lee, and R. Torelli, *A computational study of splashing drop trains: secondary droplet formation and characterization*, 30th Annual Conference on Liquid Atomization and Spray Systems (ILASS-Americas), Tempe, Arizona (2019).
30. D. Markt, R. Torelli, A. Pathak, **M. Raessi**, S. Som, R. Scarcelli, S.-Y. Lee, and J. Naber, *Using a DNS framework to test a splashed mass sub-model for Lagrangian spray simulations*, SAE Technical Paper 2018-01-0297, doi:10.4271/2018-01-0297 (2018).
31. L. Zhao, R. Torelli, X. Zhu, J. Naber, S.-Y. Lee, S. Som, R. Scarcelli, and **M. Raessi**, *Evaluation of*

diesel spray-wall interaction and morphology around impingement location, SAE Technical Paper 2018-01-0276, doi:10.4271/2018-01-0276 (2018).

32. D. Markt, L. Zhao, X. Zhu, A. Pathak, R. Torelli, S.-Y. Lee, and **M. Raessi**, *An Experimental and Computational Study of a Single Diesel Droplet Impinging on a Dry Surface*, 14th Triennial International Conference on Liquid Atomization and Spray Systems, Chicago, Illinois (2018).
33. X. Zhu, R. Torelli, L. Zhao, J. Naber, S.-Y. Lee, S. Som, R. Scarcelli, and **M. Raessi**, *Film Formation Characteristics of N-heptane Spray-wall Impingement at Engine-like Conditions*, 14th Triennial International Conference on Liquid Atomization and Spray Systems, Chicago, Illinois (2018).
34. **M. Raessi**, M. Thiele, and B. Amirzadeh, *Computational simulation of the impact and freezing of micron-size water droplets on super-hydrophobic surfaces*, Proceedings of the ASME 2013 Summer Heat Transfer Conference, Minneapolis, USA, July 14-19, 2013 (HT2013-17749).
35. S. Codyer, **M. Raessi**, G. Khanna, *Using Graphics Processing Units to accelerate numerical simulations of interfacial incompressible flows*, Proceedings of the ASME 2012 Fluids Engineering Summer Meeting, Rio Grande, Puerto Rico, July 8-12, 2012 (FEDSM2012-72176).
36. **M. Raessi** and R. Sendha, *Effects of heat transfer on the spreading and freezing of molten droplets impinging onto textured surfaces-A computational study*, Proceedings of the ASME 2012 Summer Heat Transfer Conference, Puerto Rico, USA, July 8-12, 2012 (HT2012-58166).

Peer-reviewed technical reports

37. **M. Raessi** and H. Pitsch, *Modeling interfacial flows characterized by large density ratios with the level set method*, Annual Research Briefs, Center for Turbulence Research, Stanford, CA, 2009.
38. **M. Raessi**, *A level set based method for calculating flux densities in two-phase flows*, Annual Research Briefs, Center for Turbulence Research, Stanford, CA, 2008.
39. M. Herrmann, J.M. Lopez, P. Brady, and **M. Raessi**, *Thermocapillary motion of deformable drops and bubbles*, Proceedings of the 2008 Summer Program, Center for Turbulence Research, Stanford, CA, 2008.

Conference papers & presentations (* *indicates the presenter*)

1. C. Hoi*, K. Raggiani, and **M. Raessi,** *Multi-plug instillation into a physiologically representative infant airway tree model - A computational study*, 73rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Chicago, IL (Held virtually), 2020.
2. D. Markt*, **M. Raessi**, S.-Y. Lee, and X. Zhu, *Surface impingement of high-speed micron-sized diesel drop trains: splashing characteristics and secondary droplets*, 73rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Chicago, IL (Held virtually), 2020.
3. D. Markt*, **M. Raessi**, A. Pathak, S.-Y. Lee, and R. Torelli, *Impact of high-speed diesel drop trains - pursuing cleaner diesel engines*, 73rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Gallery of Fluid Motion, Chicago, IL (Held virtually), 2020. [*Won the **Milton van Dyke Award**.*]
4. C. Hoi*, A. Heryudono, and **M. Raessi** *3D simulation of drop deposition on an eye-shaped domain using the VOF method*, 2nd Joint Society for Industrial and Applied Mathematics SIAM/CAIMS Annual Meeting (originally scheduled to be in Toronto, ON but changed to a virtual conference due to COVID-19 pandemic), July 6-17, 2020.
5. C. Hoi*, A. Pathak, and **M. Raessi** *Computational investigation of plug flow dynamics and splitting through 3D multi-branching bifurcating lung airway models*, 72nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Seattle, WA, 2019.
6. D. Markt*, A. Pathak, **M. Raessi**, R. Torelli, and S.-Y. Lee *On splashing dynamics of diesel drop trains under engine-relevant impingement conditions: A computational study*, 72nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Seattle, WA, 2019.

7. C. Hoi and **M. Raessi***, *3D computational simulations of liquid plug motion and deposition through straight tubes and bifurcating airway models with a pre-existing liquid film*, 10th International Conference on Multiphase Flow (ICMF2019), Rio de Janeiro, Brazil, 2019
8. D. Markt*, A. Pathak, **M. Raessi**, S.-Y. Lee, and R. Torelli, *A computational study of splashing drop trains: secondary droplet formation and characterization,* 30th Annual Conference on Liquid Atomization and Spray Systems (ILASS-Americas), Tempe, AZ, 2019.
9. C. Hoi*, A. Pathak, and **M. Raessi**, *3D computational investigation of plug motion and film deposition in straight and Y-shaped tubes with pre-wetted walls*, 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Atlanta, GA, 2018.
10. D. Markt*, A. Pathak, **M. Raessi**, R. Torelli, R. Scarcelli, S. Som, S.-Y. Lee, and J. Naber *Computational investigation of micron-sized diesel droplet trains impinging on thin liquid films*, 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Atlanta, GA, 2018.
11. C. Hoi and **M. Raessi***, *A 3D computational study of plug splitting dynamics and film deposition in a bifurcating airway model*, Proceedings of the ASME 2018 Fluids Engineering Summer Meeting, Montreal, QC, 2018.
12. D. Markt*, L. Zhao, X. Zhu, A. Pathak, R. Torelli, S.-Y. Lee, and **M. Raessi**, *An Experimental and Computational Study of a Single Diesel Droplet Impinging on a Dry Surface*, 14th Triennial International Conference on Liquid Atomization and Spray Systems, Chicago, Illinois, 2018.
13. X. Zhu*, R. Torelli, L. Zhao, J. Naber, S.-Y. Lee, S. Som, R. Scarcelli, and **M. Raessi**, *Film Formation Characteristics of N-heptane Spray-wall Impingement at Engine-like Conditions*, 14th Triennial International Conference on Liquid Atomization and Spray Systems, Chicago, Illinois, 2018.
14. D. Markt*, R. Torelli, A. Pathak, **M. Raessi**, S. Som, R. Scarcelli, S.-Y. Lee, and J. Naber, *Using a DNS Framework to Test a Splashed Mass Sub-Model for Lagrangian Spray Simulations,* WCX™18: SAE World Congress Experience, Detroit, MI, 2018.
15. L. Zhao*, R. Torelli, X. Zhu, J. Naber, S.-Y. Lee*, S. Som, R. Scarcelli and **M. Raessi**, *Evaluation of Diesel Spray-Wall Interaction and Morphology around Impingement Location* , WCX™18: SAE World Congress Experience, Detroit, MI, 2018.
16. V. B. Palma*, D. G. MacDonald, and **M. Raessi**, *Initializing DNS turbulence models to represent naturally occurring turbulence*, Ocean Sciences Meeting, Portland, OR, 2018.
17. D. G. MacDonald*, **M. Raessi**, and A. K. Schmidt, *Does scale matter? Bridging the gap between field and laboratory observations of turbulence*, Ocean Sciences Meeting, Portland, OR, 2018.
18. C. Hoi* and **M. Raessi**, *3D CFD simulation of plug dynamics and splitting through a bifurcating airway model*, 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Denver, CO, 2017.
19. A. Pathak* and **M. Raessi**, *Towards a sharp-interface volume-of-fluid methodology for modeling evaporation*, 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Denver, CO, 2017.
20. D. Markt*, A. Pathak, **M. Raessi**, S.-Y. Lee, and L. Zhao, *Computational study of droplet trains impacting a smooth solid surface*, 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Denver, CO, 2017.
21. A. Pathak, C. Freniere, and **M. Raessi***, *3D computational simulations of bottom-hinged pitching ocean wave energy converters*, Proceedings of the ASME 2017 Fluids Engineering Summer Meeting, Waikoloa, HI, 2017.
22. A. Pathak* and **M. Raessi**, *A fully Eulerian fictitious domain method to study interaction between moving structures and two-phase fluid flows*, 2017 SIAM Southeastern Atlantic Section Conference (SIAM-SEAS), Tallahassee, FL 2017.
23. A. Pathak* and **M. Raessi**, *Computational simulations of the interaction of water waves with pitching flap-type ocean wave energy converters*, 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Portland, OR, 2016.

24. C. Freniere*, A. Pathak and **M. Raessi**, *Computational modeling of pitching cylinder-type ocean wave energy converters using 3D MPI-parallel simulations*, 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Portland, OR, 2016.
25. **M. Raessi*** and A. Pathak, *3D, GPU-accelerated and MPI-parallel simulations of two-fluid flows interacting with moving rigid bodies – application in renewable energy systems*, International Conference of Multiphase Flow, Firenze, Italy, 2016.
26. A. Pathak* and **M. Raessi**, *A 3D MPI-Parallel GPU-accelerated framework for simulating ocean wave energy converters*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
27. W. Jin*, B. Amirzadeh, M. Tootkaboni, and **M. Raessi**, *A computational study of the impingement of water droplets onto freezing superhydrophobic surfaces*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
28. D. Brown*, L. Goodman, and **M. Raessi**, *Large Eddy Simulations of Kelvin Helmholtz instabilities at high Reynolds number stratified flows*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
29. C. Freniere*, A. Pathak and **M. Raessi**, *Feasibility of Amazon Cloud Computing Platform for Parallel Multi-phase Flow Simulations*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
30. H. Jebeli Aqdam*, B. Ahmadi, **M. Raessi**, and M. Tootkaboni, *Aiding Design of Wave Energy Converters via Computational Simulations*, 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Boston, MA, 2015.
31. A. Pathak and **M. Raessi***, *An Advanced Computational Framework For Analysis Of Ocean Wave Energy Converters,* ASME 2015 9th International Conference on Energy Sustainability, San Diego, CA, 2015.
32. A. Pathak* and **M. Raessi**, *A 3D GPU-accelerated MPI-parallel computational tool for simulating interaction of moving rigid bodies with two-fluid flows*, 67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Francisco, CA, 2014.
33. L. Berard* and **M. Raessi**, *Computational investigation of negatively buoyant jets*, 67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Francisco, CA, 2014.
34. A. Pathak* and **M. Raessi**, *Towards an advanced computational framework for 3D simulations of Ocean Wave Energy Converters*, ASME 2014 8th International Conference on Energy Sustainability, Boston, MA, 2014.
35. A. Ghasemi, A. Pathak, R. Chiodi, and **M. Raessi***, *Computational simulation of the interactions between water waves and two-dimensional wave energy converters*, 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Pittsburg, PA, 2013.
36. A. Pathak* and **M. Raessi**, *Three-dimensional advected normals method for calculating interfacial normals and curvatures in two-phase flows*, 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Pittsburg, PA, 2013.
37. L. Berard*, **M. Raessi**, M. Bauer, P. Friedman, and S. Codyer, *Experimental and computational investigation of underwater buoyant oil jets*, 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Pittsburg, PA, 2013.
38. A. Ghasemi, A. Pathak, and **M. Raessi***, *Numerical modeling of the interaction between moving solid structures and two-phase fluid flows: application in ocean wave energy converters*, SIAM Conference on Computational Science and Engineering, Boston, MA, 2013.
39. A. Ghasemi*, A. Pathak, and **M. Raessi**, *Computational simulations of wave energy converters by solving the Navier-Stokes equations*, 4th Annual Marine Renewable Energy Technical Conference, Providence, RI, 2013.
40. A. Pathak* and **M. Raessi**, *A GPU-accelerated interfacial flow solver with advected normals: Application to contact line problems*, 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.

41. A. Ghasemi*, A. Pathak, **M. Raessi**, *Computational simulation of ocean wave energy converters using the fast fictitious domain method*, 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.
42. D. Brown*, L. Goodman, **M. Raessi**, *Large Eddy Simulations of Kelvin-Helmholtz instabilities in ocean flows*, 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.
43. S. Codyer, **M. Raessi***, and G. Khanna, *Using Graphics Processing Units to accelerate numerical simulations of interfacial incompressible flows*, Proceedings of the ASME 2012 Fluids Engineering Summer Meeting, Rio Grande, PR, 2012.
44. **M. Raessi*** and R. Sendha, *Effects of heat transfer on the spreading and freezing of molten droplets impinging onto textured surfaces-A computational study*, Proceedings of the ASME Summer Heat Transfer Conference, Rio Grande, PR, 2012.
45. S. Codyer*, **M. Raessi**, G. Khanna, *Accelerated computational simulations of incompressible multi-phase flows in a parallel, heterogenous multi-GPU/CPU computing framework*, International Conference on Numerical Methods in Multiphase Flows, University Park, PA, 2012.
46. **M. Raessi∗**, A. Pathak, J. Mostaghimi, and M. Bussmann, *On the accuracy and performance of the advected normals approach in simulating interfacial flows*, International Conference on Numerical Methods in Multiphase Flows, University Park, PA, 2012.
47. S. Codyer*, **M. Raessi**, G. Khanna, *A GPU-accelerated flow solver for incompressible two-phase fluid flows*, 64th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Baltimore, MD, 2011.
48. **M. Raessi*** and R. Sendha, *A computational study of the impact of molten drops onto textured surfaces*, 64th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Baltimore, MD, 2011.
49. S. Codyer*, **M. Raessi**, G. Khanna, *A GPU-accelerated flow solver for incompressible two-phase fluid flows*, Advances in GPU Computing Conference, Northeastern University, Boston, MA, October 27, 2011.
50. **M. Raessi***, M. Bussmann, and J. Mostaghimi, *A volume-of-fluid interfacial flow solver with advected normals*, 63rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Long Beach, CA, 2010.
51. **M. Raessi*** and H. Pitsch, *A level-set based methodology for modeling interfacial flows characterized by large density ratios*, Proceedings of the 22nd Annual ILASS-Americas Conference, Cincinnati, OH, May 16-19, 2010.
52. **M. Raessi*** and H. Pitsch, *A level set based method for modeling large density ratio, interfacial flows*, 62nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), Minneapolis, MN, 2009.
53. **M. Raessi***, M. Bussmann, and J. Mostaghimi, *An implicit implementation of surface tension in finite volume models for two-phase flows*, Proceedings of the 20th Annual ILASS-Americas Conference, Chicago, IL, May 15-18, 2007.
54. **M. Raessi***, M. Bussmann, and J. Mostaghimi, *Advecting normal vectors: A novel method for accurate interface curvature calculation*, Euromech Colloquium 479, Numerical Simulation of Multiphase Flow with Deformable Interfaces, Scheveningen, The Netherlands, 2006.
55. **M. Raessi***, J. Mostaghimi, and M. Bussmann, *A new method in calculating interface normal vectors and curvatures in modeling free-surface flows*, Proceedings of the 19th Annual ILASS-Americas Conference, Toronto, ON, May 23-26, 2006.
56. **M. Raessi***, J. Mostaghimi, and M. Bussmann, *Impact and solidification of droplets onto rough substrates*, in: E. Lugscheider (Ed.), International Thermal Spray Conference, Basel, Switzerland May 2-4, 2005.
57. **M. Raessi***, J. Mostaghimi, and M. Bussmann, *Droplet impact during the plasma spray process - Effect of surface roughness on splat shapes*, in: J. Mostaghimi, T.W. Coyle, V. Pershin, and H.R. Salimijazi

(Eds.), 17th International Symposium on Plasma Chemistry, Plasma Spray and Thermal Plasma Materials Processing, Toronto, ON, August 7-12, 2005.

58. **M. Raessi*** and J. Mostaghimi, *Three-dimensional modeling of solidification shrinkage*, Proceedings of the 11th Annual Conference of the CFD Society of Canada, Vancouver, BC, May 28-30, 2003, pp.74-79.
59. A. McDonald, **M. Raessi**, S. Chandra*, J. Mostaghimi, C. Moreau, *Fragmentation of plasma-sprayed molybdenum particles on glass surfaces*, in: B. Marple, M. Hyland, Y. Lau, R. Lima, and J. Voyer (Eds.), International Thermal Spray Conference, Seattle, WA, May 15-17, 2006.
60. H.R. Salimijazi*, **M. Raessi**, T.W. Coyle, and J. Mostaghimi, *Numerical simulation and experimental evaluation of solidification behavior of vacuum plasma sprayed Ti-6Al-4V alloy*, in: J. Mostaghimi, T.W. Coyle, V. Pershin, and H.R. Salimijazi (Eds.), 17th International Symposium on Plasma Chemistry, Plasma Spray and Thermal Plasma Materials Processing, Toronto, ON, August 7-12, 2005.
61. J. Mostaghimi* and **M. Raessi**, *Heat transfer in thermal spray coatings*, in: G. Vaidyanathan, B.V.S.S.S. Prasad, C. Balaji, Y. Joshi (Eds.), XVII National and VI ISHMT/ASME Heat and Mass Transfer Conference, IGCAR, Kalpakkam, India, Jan. 5-7, 2004, pp. 8-17.
62. N.Z. Mehdizadeh, **M. Raessi**, S. Chandra*, and J. Mostaghimi, *Effect of substrate temperature on splashing of molten tin droplets*, in: G. Vaidyanathan, B.V.S.S.S. Prasad, C. Balaji, Y. Joshi (Eds.), XVII National and VI ISHMT/ASME Heat and Mass Transfer Conference, IGCAR, Kalpakkam, India, Jan. 5-7, 2004, pp. 244-249.

Patents

1. G. E. Brown, C. Menino, D. G. MacDonald and **M. Raessi**, *Wave Energy Converter Charging Station for Autonomous Underwater Vehicles,* Provisional Patent Application P03629-US, UMass Ref. No. UMD20-03 (2020).
2. G. E. Brown, C. Menino, W. Michaud, N. White, D. G. MacDonald and **M. Raessi**, *Oscillating Tension Wave Energy Converter,* Provisional Patent Application P03645-US, UMass Ref. No. UMD20-10 (2020).

INVITED TALKS

1. Massachusetts Clean Energy Center – April 16, 2020.
2. Arnie Talk at University of Massachusetts – Dartmouth, November 30, 2017.
3. University of Massachusetts-Amherst, Mechanical & Industrial Engineering Department, November 9, 2015.
4. Woods Hole Oceanographic Institution (WHOI), Woods Hole, MA, November 6, 2013.
5. Naval Underwater Warfare Center, Newport, RI, August 17, 2013 (UMD-NUWC Discussion series).
6. United Technologies Research Center, Hartford, Connecticut, March 8, 2013.
7. Naval Underwater Warfare Center, Newport, RI, August 31, 2012.
8. University of Rhode Island, Mechanical Engineering Department, October 14, 2011.
9. Massachusetts Institute of Technology, Department of Mechanical Engineering, Dr. Kripa Varanasi's research lab, August 19, 2011.
10. University of Massachusetts-Dartmouth, Scientific Computing Group, March 14, 2011.
11. University of Rhode Island, Graduate School of Oceanography, January 14, 2011.
12. Southeastern Regional Planning & Economic Development District, Taunton, MA, December 1, 2010.
13. School for Marine Science and Technology, UMass Dartmouth, October 20, 2010.

14. Rutgers University, Department of Mechanical & Aerospace Engineering, March 2010.
15. University of Maryland (College Park), Department of Mechanical Engineering, October 2009.

RESEARCH GRANTS

*Secured **$1,166,966** in external research funding (excluding MUST grant) as the lead PI to date; Total for all grants: **$2,374,546** PI or Co-PI (excluding MUST grant)*

Principal Investigator Grants

1) *Collaborative Research: Integrated experimental and computational investigations of exogenous surfactant distribution in conducting zone lung airways,* **National Science Foundation (NSF) Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET) – Fluid Dynamics Program**, $230,000: UMASS-D budget out of $460,000 (08/01/2019 – 07/31/2022).
2) *REU Supplement: Collaborative Research: Integrated experimental and computational investigations of exogenous surfactant distribution in conducting zone lung airways,* **NSF CBET – Fluid Dynamics Program**, $14,012 (06/01/2020 – 07/31/2022).
3) *Advanced computational investigation of nose curvature and surface hydrophobicity effects in water entry of solid objects,* **Office of Naval Research - Marine and UnderSea Technology (MUST) Research Program**, $290,547 (09/17/2020 – 09/16/2023).
4) *Evaporation Sub-Model Development for Volume of Fluid (eVOF) Method Applicable to Spray-Wall Interaction Including Film Characteristics with Validation at High Pressure/Temperature Conditions* (Collaborative project with Michigan Technological Univ. (L) & Argonne National Lab), **US Department of Energy**, $240,000: UMASS-D budget out of $740,000 (01/01/2017 – 12/31/2019).
5) *Evaporation Sub-Model Development for Volume of Fluid (eVOF) Method Applicable to Spray-Wall Interaction,* **Massachusetts Clean Energy Center**, $35,154 (01/01/2017 – 12/31/2019).
6) *Development of a reduced-basis, physics-driven model for fuel spray-wall interaction in internal combustion engines,* **UMASSD Multidisciplinary Seed Funding**, $34,497 (03/01/2017 – 08/31/2017).
7) *Graduate Research Support,* **Center for Scientific Computing and Visualization Research Seed Funding**, $4,070 (05/01/2019 – 09/01/2019).
8) *Graduate Research Support,* **Center for Scientific Computing and Visualization Research Seed Funding**, $4,058 (04/01/2018 – 06/30/2018).
9) *Funding to purchase Intel Parallel Studio XE Professional Edition,* **Center for Scientific Computing and Visualization Research Seed Funding**, $3,449 (06/01/2017 – 08/31/2017).
10) *Graduate Research Support,* **Center for Scientific Computing and Visualization Research Seed Funding**, $4,058 (06/01/2017 – 08/31/2017).
11) *Advanced computational simulations of ocean wave energy converter devices - Investigation of the limit of Froude scaling method and the impact of fluid-structure interaction in multi-body devices*, **NSF Program of Extreme Science and Engineering Discovery Environment (XSEDE)**, 480,000 Service Units of compute time on LSU (superMIC) Supercomputing Cluster, $32,217.60 (07/01/2017 – 06/30/2018).
12) *An advanced 3D computational framework for simulating multiphase flows with fluid-structure interaction - Application in ocean wave energy conversion,* **NSF XSEDE Program** (Allocation No. TG-ENG170004), 50,000 Core-hour of compute time on TACC Stampede Supercomputing Cluster, $1,739 (03/10/2017 – 03/09/2018).
13) *Collaborative Research: Analysis and design of textured super-hydrophobic surfaces capable of preventing ice formation on wind turbine blades,* **NSF CBET** - Energy for Sustainability program, $214,583 *(09/01/2013 - 08/31/2019).*

14) *A comprehensive computational framework for analysis and optimization of wave energy converters,* **NSF CBET**, Energy for Sustainability Program $368,221 (09/01/2012 - 08/31/2017).

15) *Numerical simulations and analysis of the refrigeration system developed by Sunwell*, **Sunwell Technologies Inc**., $41,250 (2011).

16) *GPU-accelerated numerical simulations of interfacial flows with applications in energy systems, material processing and bio-engineering*, **Nvidia's Academic Partnership Program**, $3,800 (in kind) (2011).

17) *Performing fast numerical simulations of interfacial flows using GPUs – Application in energy systems and material processing*, the UMass Dartmouth Chancellor's Research Fund and the Joseph **Healey** Endowment, $6,500 (2011).

18) *Deposition of micro-particles and coating formation during the thermal spray coating process*, **RISE Program of German Academic Exchange Service** (**DAAD-RISE**), one RA for summer (2012).

19) *Designing super ice-phobic surfaces for wind turbine blades to prevent ice accretions*, **DAAD-RISE**, one RA for summer (2012).

Co-Principal Investigator Grant

20) *PUMA-VOF: Partition of Unity Multivariate Approximation for the Volume-of-Fluid Method***, NSF DMS – Computational Mathematics Program**, $199,988 (09/01/2020 – 08/31/2023).

21) *Optimization and testing of the MADWEC platform,* **National Renewable Energy Laboratory of Department of Energy** -– Marine Energy Collegiate Competition**,** $20,000, (12/01/2020 – 08/31/2021)

22) *MADWEC development to power the Blue Economy,* **National Renewable Energy Laboratory of Department of Energy** -– Marine Energy Collegiate Competition**,** $15,000, (12/01/2019 – 08/31/2020)

23) *A Heterogeneous Terascale Computing Cluster for the Development and Efficient Implementation of High-Order Numerical Methods,* **Office of Naval Research**, $643,899, (06/01/2018 – 05/31/2019)

24) *University of Massachusetts Center for Advanced Coatings,* **UMass President's Office Science & Technology Initiative Fund**, $136,000 (07/01/2014 - 06/30/2015).

25) *The role of scale in the development and evolution of stratified shear turbulence, entrainment and mixing***, Office of Naval Research**, $155,121 (09/01/2015 - 08/31/2017).

TEACHING ASSIGNMENTS

University of Massachusetts-Dartmouth, Department of Mechanical Engineering

Course Instructor

EGR 102 – Introduction to Applied Science and Engineering II

MNE 421 – Thermal Systems Design

MNE 435 – Ocean Wave Energy Conversion

MNE 504 – Advanced Mechanics of Fluids

MNE 542 – Convective Heat Transfer

MNE 545 – Heat Transfer with Phase Change

MNE 552 – Computational Fluid Mechanics

ACADEMIC SERVICE

Served as a **panelist** and an ad-hoc proposal **reviewer** for the **National Science Foundation.**

Reviewed a research proposal for the **American Chemical Society Petroleum Research Fund.**

Reviewed a grant proposal submitted to the Natural Sciences and Engineering Research Council of Canada (Canadian equivalent of NSF).

Chaired the Renewable Energy session at the 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS/DFD), San Diego, CA, 2012.

Reviewed manuscripts submitted for publication in:

- Journal of Fluid Mechanics
- Physics of Fluids (multiple papers)
- Journal of Computational Physics (multiple papers)
- International Journal for Numerical Methods in Fluids (multiple papers)
- American Institute of Aeronautics and Astronautics (AIAA) Journal
- Journal of Fluid and Structures
- Applied Numerical Mathematics
- Atomization and Sprays (multiple papers)
- Theoretical and Computational Fluid Dynamics
- Journal of Visualization
- Journal of Thermal Spray
- Advances in Water Resources Journal
- Chemical Engineering Science Journal
- Computers and Fluids (multiple papers)
- International Journal of Thermal Sciences
- Proceedings of the 2012 ASME Summer Heat Transfer Conference
- Proceedings of the 2010 International Conference on Liquid Atomization and Spray Systems
- CTR Annual Research Brief, Stanford University (multiple papers)

Advising the following graduate and undergraduate research assistants (* indicates expected thesis completion date):

- Stephen Codyer (MS; Completed August 2012)
- Amirmahdi Ghasemi (MS; Completed August 2013)
- Leandre Berard (MS; Completed May 2015)
- Ashish Pathak (EAS-PhD; Completed May 2017)
- Wen Jin (EAS-PhD; Summer 2021*)
- Koray Senol (MS; Completed July 2016)
- Cole Freniere (BS/MS; Completed May 2018)
- Cory Hoi (MS; Completed May 2021)
- Cory Hoi (EAS-PhD; Summer 2023*)
- David Markt (MS; Completed January 2021)
- Aaron Mak (BS/MS; Summer 20201)
- Alexander Sinkevich (MS; co-advised with Prof. Bhowmick; Completed July 2015)
- Ayo Adebanjo (MS; co-advised with Prof. Bhowmick; Summer 2022*)
- Vashkar Bernard Palma (MS; co-advised with Prof. MacDonald; Completed May 2018)
- Gregory Browne (MS; co-adivsed with Prof. MacDonald; Summer 2022*)
- Hejar Jebeli (MS; co-advised with Prof. Tootkaboni; Completed November 2015)
- Kevin Raggiani (Undergraduate)
- Lucas Pimentel (Undergraduate)
- Jonathan Hammel (Undergraduate)
- Cole Freniere (Undergraduate)
- Robert Chiodi (Undergraduate)
- Miranda Thiele (Visiting German undergraduate student)
- Stefan Apfelbeck (Visiting German undergraduate student)
- Rajkamal Sendha (Visiting IIT undergraduate student)

- Michael Bauer (Undergraduate)

Advising the following teams of students in their senior design projects:

- Jocelyn Bourgeois, Carvens Marcellus, Olivier Wikina, Corey Wynott (2010-2011)
- Robert Chiodi, Evan Crocker, Brandon Malaguti, Robert Reis (2013-2014)
- Kipp Standley, Timothy Camilleri, Omar Elbanna, and Michael Graham (2014-2015) - *Won the Second Prize.*
- Stephen Scolamiero, David Kelsey, Shahbaz Khan, Tanner Kisla, Irakoze Vincent (2016-2017)
- Jillian Gamblin, Christopher Donahue, Daniel Camara, Chase Ferry, Austin O'Connell (co-advised with Dr. Wenzhen Huang; 2016-2017).
- Joseph Echelmeier, Mackenzie Bernard, Curtis Dawe, Brandon Haghighi (2017-2018).
- Gregory Browne, William Michaud, Nicholas White, Aleksey Bourgoun, Christopher Meninno (2019-2020) – *Won the Third Prize.* Also, co-advised this team with Dr. Dan MacDonald and Prof. Karlson for the 2019-20 **Marine Energy Collegiate Competition** organized by NREL and the Water Power Technologies Office at the **US Department of Energy**, which won the **Second Place Overall Prize** and **Best Poster Award**.
- Lucas Pimentel, Geoffrey Souza, Cameron Jasparro, Colby Martin, Brett Murray, Christopher Carstairs (2020-2021) – *Won the Third Prize*. Also, co-advised this team with Dr. Dan MacDonald and Prof. Karlson for the 2020-21 **Marine Energy Collegiate Competition** organized by NREL and the Water Power Technologies Office at the **US Department of Energy**, which won the **Best Poster Award**.

PROFESSIONAL AFFILIATIONS

American Society for Mechanical Engineering (ASME)

American Physical Society (APS)