

Center for Multiscale Modeling of Multiphase Combustion
University of Florida
PSAAP4 Products

Publications

2026

1. T. Daoud, T.L. Jackson, S. Balachandar. (2026) A Careful Examination of Closure Models in Euler-Lagrange Simulations of Compressible Multiphase Flow in a Planar Shock Particle Curtain Problem, *International Journal of Multiphase Flow*, **201**, 105740.
<https://doi.org/10.1016/j.ijmultiphaseflow.2026.105740>
2. Prosperetti, A., Lott, C. P., Balachandar, S. (2026) Force on a sphere in a general potential flow. *Journal of Fluid Mechanics*, **1034**, R3.
<https://doi.org/10.1017/jfm.2026.11504>
3. C.T.V. Nunes, C.D. Willhardt, J.L. Manin, E. Berrocal, D.R. Gueldenbecher, Corrections for Accurate Measurements of Particle Extinction in Scattering Media using Collimated and Diffuse Illumination, *Optics Express*, **34**,R8, pp. 14068-14085
<https://doi.org/10.1364/OE.591768>
4. D. Anderson, T.L. Jackson, S. Balachandar. Flow Prediction in Hydrodynamically Coupled N-Particle Systems via Superposition of One-Particle Solutions with Potential Flow Example. *Submitted to Journal of Computational Physics*, 2026.

Conference Papers

2026

1. C.T.V. Nunes, R.L. Travis, D.R. Gueldenbecher (2026) Extinction Imaging of Particle-Laden Explosive Blast Waves, *Spring Technical Meeting of the Central States Section of the Combustion Institute*, West Lafayette, Indiana, May 17-19.
2. A.V. Millauer-Hsu, C.T.V. Nunes, D.R. Gueldenbecher (2026) Measurements of Carbon Rod Combustion Rates, *Spring Technical Meeting of the Central States Section of the Combustion Institute*, West Lafayette, Indiana, May 17-19.
3. G. O'Brien, J.W. Posey, C. Spangler, R.W. Houim (2026) Modeling the Dispersal, Ignition, and Combustion of Magnesium Particles by an Explosive Charge, *Spring Technical Meeting of the Central States Section of the Combustion Institute*, West Lafayette, Indiana, May 17-19.

Presentations

2026

1. D. Anderson, S. Balachandar, T.L. Jackson. Deterministic Modeling of Coupled Multiphase Interactions for Euler-Lagrange Simulations. 79th Annual Meeting of the Division of Fluid Dynamics, Orlando, FL, November 22–24, 2026.

2. Joshua Gillis, Benjamin Wilfong, Daniel J. Vickers, Spencer H. Bryngelson, Thomas L. Jackson, Sivaramakrishnan Balachandar. Toward Predictive Simulation of Particle Instabilities in Explosive Dispersal Using the Exascale Multiphase Flow Solver MFC. 79th Annual Meeting of the Division of Fluid Dynamics, Orlando, FL, November 22–24, 2026.
3. Byeong-Cheon Kim, Mike Vandenboom, Thomas L. Jackson, Spencer H. Bryngelson, Benjamin Wilfong, Daniel J. Vickers, Sivaramakrishnan Balachandar. Database Construction and Characterization of Pseudo-Turbulence Closure Quantities for Stationary Particle Arrays in Compressible Flow. 79th Annual Meeting of the Division of Fluid Dynamics, Orlando, FL, November 22–24, 2026.
4. J. B. Harley, Physics to Filters: Understanding Nature Via Signal Processing, Invited Lecture, University of Florida IEEE Signal Processing Society Chapter, 11 March (2026).
5. J. B. Harley, Artificial Intelligence with Physical Knowledge: Examples in Materials Science and Nondestructive Evaluation, University of Florida Fluids Seminar, 9 October (2025).
6. S. Balachandar, Modeling and Machine Learning For Massive Simulations of Multiphase Flows, Invited Seminar, Mechanical and Aerospace Engineering Department, University of Houston, Houston, TX, 6 March (2026).
7. S. Balachandar, Center for Multiscale Modeling of Multiphase Combustion (CM3C), Invited Lecture, DOE-NNSA PSAAP-4 Kickoff Meeting, 26 August (2025).
8. S. Balachandar, Shock-Particle Interaction and Explosive Dispersal of Particles, Invited Seminar, Aerospace Engineering Department, Indian Institute of Technology Madras, Chennai, India, 21 January (2026).
9. S. Balachandar, How to Harness the Powers of Machine Learning for Unprecedented Advances in Multiscale Modeling of Multiphase Flows, Invited Lecture, AI-Driven CFD Symposium, Gandhinagar, India, 13 January (2026).
10. S. Balachandar, Investigation of the Structure and Dynamics of Particle-Laden Turbidity Currents, Invited Lecture, MADRAS-2026, Zanzibar, Tanzania, 7 January (2026).
11. S. Balachandar, How to Harness the Powers of Machine Learning for Unprecedented Advances in Multiscale Modeling of Multiphase Flows, Invited Lecture, American-Japanese-European Two-Phase Flow Group Meeting, MIT, MA, 22 September (2025).

Websites

- <https://www.eng.ufl.edu/cm3c/> [CM3C website]
- <https://cm3c.slack.com> [CM3C slack]
- <https://mflowcode.github.io> [MFC website]
- <https://github.com/MFlowCode/MFC> [MFC Github repository]
- <https://mflowcode.slack.com> [MFC slack]