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March 2022 CoMFRE Newsletter

Message from the Director

It appears spring has arrived in Iowa, but I would not be surprised by one more snowfall. As spring settles in, we are renewed with ideas of new research and projects. Spring also marks an annual change in our CoMFRE Leadership Team at ISU. We have organized CoMFRE to have a 6-member leadership team, where 3 are permanent and 3 serve rotating 3-year terms. The current leadership team includes myself (Director), Alberto Passalacqua (Associate Director), and Rodney Fox (Executive Director) as the three permanent members, and rotating members Shankar Subramaniam (finishing his 3rd year), Hui Hu (finishing his 2nd year), and Nicole Hashemi (finishing her 1st year). The rotating members are selected by the current CoMFRE faculty. The new member is highlighted below. I would like to thank Shankar for serving the past 3 years. I would also like to thank him for his vision and leadership in getting CoMFRE started, and for the continued council and support he has provided me since I became Director. Shankar is still part of CoMFRE, but for the next year, he will be on sabbatical as a visiting professor at the Indian Institute of Technology, Madras.

Enjoy the spring and recognize the multiphase flows around you, from the falling rain to the flocks of birds flying through the air to the farm operations planting a new crop.



Theodore (Ted) J. Heindel
Director, Center for Multiphase Flow Research and Education
University Professor
Bergles Professor of Thermal Sciences



2022 CoMFRE Annual Meeting

The 2022 CoMFRE Annual Meeting will take place on October 24th and 25th, 2022. The current plan is for an in-person meeting on the ISU campus with live presentations and a live student poster competition. More details will follow, but

please put a hold on your calendar.

New CoMFRE Leadership Team Member

James Michael was selected by CoMFRE faculty members to be the newest member of the CoMFRE Leadership Team. He replaces Shankar Subramaniam who was our founding director. We will miss Shankar's direct involvement, but he is not going away and will still be a valuable CoMFRE member. James brings his experience in optical and laser-based spectroscopic and measurement approaches for characterizing multiphase and reacting flow fields. James, welcome to our team.

CoMFRE and CoMFRE Affiliates in the News

Addressing Environmental Injustice with Pathogen Exposure Research after Floods

Chris Rehmann, CoMFRE faculty researcher and associate professor of civil, construction and environmental engineering, is studying the impact of pathogens left behind when floodwaters surge. The research team will create a pathogen hotspot map to identify what communities would most benefit from measures to mitigate risks.

Find the full story [here](#)

CoMFRE Impacting Peer-Reviewed Journals

CoMFRE researchers serve on editorial teams at the top peer-reviewed journals of multiphase flows – and in the broader area of engineering – amplifying the center's international impact in the field. Two CoMFRE affiliates serve as senior editors or editors, six are associate editors and five are on editorial advisory boards.

Find the full story [here](#)

Cyclone Engineers Advance Fluids Research at Argonne National Lab

A team of mechanical engineering researchers were able to advance their research in the field of atomization and sprays by utilizing the Advance Photon Source available at the U.S. Department of Energy's Argonne National Laboratory. Using high-speed X-ray flow visualization, they examined how spray formation is affected by various gas/liquid momentum ratios, ambient pressures, and ratios of swirling air to straight-flowing air.

Find the full story [here](#)

Recently Funded Research

Feel free to contact the PI directly if you have any questions on the projects below.

"Collaborative Research: Droplet Breakup in Homogenous Turbulence: Model Validation through Experiments and Direct Numerical," **Michael Olsen, Rodney Fox, Dennis Vigil**. Funding Agency: National Science Foundation; New Funding Amount: \$440,168.

Recent Journal Publications

Note that CoMFRE affiliates are identified by **bold** names

- Bothell, J.K., Morgan, T.B., Kastengren, A.L., and **Heindel, T.J.**, “Fluid Flow Observations of the Spray Near-Field using High-speed X-ray Imaging,” *Journal of Flow Visualization and Image Processing*, 29:2 1-26, 2022.
- McNamara, M.C., Aykar, S.S., Alimoradi, N., Niaraki Asli, A.E., Pemathilaka, R.L., Wrede, A.H., Montazami, R., and **Hashemi, N.N.** “Behavior of Neural Cells Post Manufacturing and After Prolonged Encapsulation within Conductive Graphene-Laden Alginate Microfibers,” *Advanced Biology*, 2101026 (2021)
- Niaraki Asli, A.E., McNamara, M.C., Montazami, R., and **Hashemi, N.N.** “[Graphene Microelectrodes for Real-Time Impedance Spectroscopy of Neural Cells.](#)” *ACS Applied Bio Materials*, 5, 1, 113–122 (2022)

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