Dynamics of droplet impact: two stories

Abhishek Saha, PhD
Department of Mechanical and Aerospace Engineering
University of California, San Diego

Friday, June 9, 2023 – 10:30 am
McDonnell Douglas Engineering Auditorium (MDEA)

Abstract: Droplet impact on surfaces is ubiquitous in natural and engineering processes. From raindrops falling onto ocean surfaces to industrial applications such as additive manufacturing, inkjet printing, and spray coating, droplet impact plays a critical role in controlling mass, energy, and species transport. In this talk, we will discuss two classes of droplet impact problems. In the first part, we will explore the effect of substrate oscillation on the dynamics of the impacting droplets. In particular, the spreading and deformation of the droplet will be analyzed as a function of oscillation parameters, i.e., frequency, amplitude, and phase. We will also highlight the remarkable transformation in the dynamics as the substrate oscillation transits from low to high-frequency ranges. In the second part, we will focus on droplet impact on facemasks, a form of porous media. Motivated by the recent COVID-19 pandemic, we will explore the fate of respiratory droplets interacting with single and multi-layer facemasks. By discussing the physical evidence in light of physics-based analyses, we will show why multi-layer masks are better for preventing the spread of diseases.

Bio: Abhishek Saha is an Assistant Professor in the Department of Mechanical and Aerospace Engineering at the University of California San Diego. His research group focuses on three areas, (1) dynamics of droplets in the context of propulsion, manufacturing, and disease transmission; (2) propagation, morphology, and stability of flames; and (3) thermo-acoustic and flow-structure instabilities. Before joining UCSD, Prof. Saha was a research staff at Princeton University. He completed his Ph.D. at the University of Central Florida, where he received the university-wide outstanding dissertation award. Prof. Saha is a recipient of the NSF Faculty Early Career Development (CAREER) Award in 2022.