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Understanding fundamental fluid fragmentation to control disease transmission

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ABSTRACT:

Despite major public health efforts to investigate the spread of infectious diseases, the fundamental mechanisms governing transmission and contamination by most pathogens remain poorly understood. In particular, a critical gap persists in our understanding of the bridge between the population-level and pathogen-level mechanisms involved. Fluid processes and physical laws combined with biological processes are key in filling this gap. In this talk, I will discuss a series of representative examples on how fluid dynamics and, in particular, interfacial flows and fluid fragmentation are critical in shaping the contamination patterns resulting from pathogen-bearing droplet formation. I will present an overview of our approach, combining theory and experiments, to rationalize droplet formation in the context of contamination in a range of public health and food safety systems.

BIOGRAPHY:

Prof. Lydia Bourouiba is the Esther and Harold E. Edgerton Career Development Professor at the Massachusetts Institute of Technology. She directs the Fluid Dynamics of Disease Transmission Laboratory in which the research focuses on the interface between fluid dynamics and epidemiology. Her research group is dedicated to the fundamental understanding of the fluid dynamics shaping the transmission of pathogens in human, animal, and plant populations where drops, bubbles, multiphase and complex flows are at the core. More on her recent work can be found at lbourouiba.mit.edu.