# ME – M.Tech (Res) Thesis Defense

## Classical Approach to Understanding the Impact Dynamics of Hollow Droplets

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### ABSTRACT

Compound droplets are utilized in applications ranging from emulsion preparation to biological cell printing and additive manufacturing. In this work, we report on the impact dynamics of a compound hollow droplet on a solid substrate. Contrary to the impact of pure droplets and compound droplets with liquids of similar densities, the compound droplet with an encapsulated air bubble demonstrates the formation of a counter jet in addition to the lamella. Here, we experimentally investigate the influence of the size of the air bubble, liquid viscosity, and height of impact on the evolution of the counter-jet and the spreading characteristics of the lamella. For a given hollow droplet, the volume of the counter-jet is observed to depend on the volume of air and liquid in the droplet and is independent of the viscosity of the liquid and impact velocity of the droplet. We observe that the spread characteristics, counterintuitively, do not vary significantly compared to that of a pure droplet having an identical liquid volume as the hollow droplet. We propose a model to predict the maximum spread during the impact of a hollow droplet based on the energy interaction between the spreading liquid and the liquid in the counter-jet during the impact process.


### ABOUT THE SPEAKER

Deekshith completed his bachelor's from the SVNIT, Surat, in 2017. He joined IISc in 2019 as an M-Tech. research student and is working with Dr. Susmita Dash in Multiscale Transport and Energy Research Laboratory, Department of Mechanical Engineering. His research interests include fluid mechanics in general and droplets in particular. His hobbies are medium distance running and high-speed photography when an object is placed within 20cm :)