Proposed ILASS Seminar Title and Abstract

Cavitation in Spray Nozzles – Progress and Challenges

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Cavitation is a common occurrence in the nozzles used to produce sprays for a wide range of applications, from automotive and aerospace fuel injectors to medical inhalers. Aside from its effects on nozzle erosion, cavitation alters the initial conditions for spray formation and generates instabilities and vortical structures which can influence the atomisation process in complex ways. After more than 50 years of research on orifice and nozzle cavitation, many research questions are yet to be answered. Cavitating flows are unsteady and three-dimensional in even in the simplest canonical geometries. Practical considerations for real-world engineering systems such as the effects of dissolved gases, and the role of cavitation on flash-evaporating sprays remain unresolved. Over the last 15 years, advancements in X-ray diagnostics and numerical simulation have made some progress in answering these questions. Supported by conventional optical diagnostics, we show how a fusion of measurement techniques continues to advance our fundamental understanding of these complex multiphase flows while also addressing practical engineering challenges spanning energy, climate change and healthcare.