

Boulder Fluid and Thermal Sciences Seminar Series



Tuesday, October 16, 2018

3:30pm-4:30pm (refreshments at 3:15pm)

Mechanical Engineering Conference Rooms in the Engineering Center

University of Colorado, Boulder

Jets, shocks, and light emission from collapsing cavitation bubbles

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The impulsive motion of oscillating and collapsing bubbles generate fast flows able to cause erosion in hydraulic machinery but, when controlled, can be beneficial in a wide range of applications such as in biomedicine (e.g., drug delivery, kidney stone reduction, intraocular surgery), cleaning, microfluidics, and food processing. The powerful properties of these bubbles are attributed to the strong acoustic transients, high-speed jetting, and intense thermal effects associated with their violent collapse. In the aim of controlling these phenomena and thereby helping to design the bubbles' collapse configuration to suit a given application, we have developed semi-empirical models to quantify and predict the strength of the micro-jets, shock waves, and light emission from the collapse of single cavitation bubbles. In this talk, I will present the different experimental techniques we use to capture the dynamics of laser-induced bubbles and our adventures on the European Space Agency parabolic flights, and discuss how gravity and other sources of bubble deformation affect their various collapse events. I will also discuss how the impulsive motion of bubbles open future avenues in numerous biomedical and engineering applications.

Biography: Dr. Outi Supponen obtained her MEng in Aeronautical Engineering in 2013 at Imperial College London and her PhD in Mechanical Engineering in 2017 at the Swiss Federal Institute of Technology Lausanne (EPFL). She is interested to find out how oscillating and collapsing bubbles and the resulting high-speed flows can be used for beneficial purposes in numerous applications. Currently, as a postdoctoral fellow at CU Boulder, she is working with Profs. Mark Borden and Todd Murray on the dynamics of microbubbles and nanodroplets used in biomedical imaging and therapy.

