Boulder Fluid and Thermal Sciences Seminar Series

Tuesday, November 27, 2018
3:30pm-4:30pm (refreshments at 3:15pm)
Mechanical Engineering Conference Rooms in the Engineering Center
University of Colorado, Boulder

The Curious Dynamics of Translating Bubbles: Nonspherical Shape Oscillation, Stability, and the Influence of Encapsulation

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When subject to an acoustic field, bubbles will translate and oscillate in interesting ways. This motion is highly nonlinear and its understanding is essential to the application of bubbles in diagnostic ultrasound imaging, microbubble drug delivery, and acoustic cell sorting, among others. This talk will review some of the interesting physics that occur when bubbles translate in an acoustic field, including Bjerknes forces, the added mass effect, and acoustic trapping. The influence of an encapsulating shell on the nonspherical shape oscillation and stability of a translating microbubble will be analyzed in detail and the results from recent simulations presented. The findings demonstrate the counterintuitive result that, compared to a free gas bubble, the encapsulation actually promotes instability when the microbubble translates due to an acoustic wave.

Biography: Prof. Michael Calvisi joined the faculty of the Department of Mechanical and Aerospace Engineering at the University of Colorado, Colorado Springs in 2010 as an Assistant Professor and received tenure and promotion to Associate Professor in 2017. He received his B.S. degree in Mechanical Engineering from the University of California, Berkeley where he later received his M.S. and Ph.D. degrees in Applied Science and Technology. After completion of his Ph.D. in 2006, he held post-doctoral researcher positions at the University of Birmingham in the United Kingdom and at Northwestern University prior to joining the faculty at UCCS. Prof. Calvisi's research interests are in theoretical and computational fluid dynamics with an emphasis on multiphase flows and biofluid mechanics. He has particular interests in bubble dynamics and ultrasound, along with their applications in biology and medicine. He has received the National Science Foundation CAREER Award (2017-2022) and the *Researcher of the Year* award from the College of Engineering and Applied Science at UCCS (2017).