Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Uncertainty quantification in bubble dynamics TIM COLONIUS, California Institute of Technology, ROB HAGMEIJER, University of Twente — We examine models for the statistics of bubble dynamics when the equilibrium radius is a random variable. Such statistics are likely to be in important in continuum (phase-averaged) bubbly flow models, but these models typically assume a single known value for equilibrium radius. For the case of linearized bubble dynamics, the temporal evolution of the moments of the joint probability distribution function of bubble radius, bubble radial velocity, and equilibrium radius is examined. A formula for statistical equilibrium for the case of high Reynolds and Weber numbers is derived. These results are compared to standard reduced-order polynomial chaos expansions of the Rayleigh-Plesset equation and improved models are suggested. Acoustic wave propagation in bubbly media is considered as an application of the linear models. Strategies and preliminary results for the case of nonlinear bubble dynamics will also be presented.

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Date submitted: 04 Aug 2006 Electronic form version 1.4