Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Study on bubble shape interacted with vortex motion via mathematical approach YUKIHIRO YONEMOTO, TOMOAKI KUNUGI, AKIMI SERIZAWA, Kyoto University — There are many unclear mechanisms regarding bubble coalescence and breakup both experimentally and numerically. In general, it is considered that the processes of bubble coalescence and breakup are composed of several microscopic interfacial phenomena such as intermolecular force, electric double layer, surfactant and so on. On the other hand, a hydrodynamic force like a vortex motion is a dominant factor in fluid flows. A geometrical change of a bubble due to the hydrodynamic force could be related to the microscopic phenomena at a gas-liquid interface. In this study, we focus on the relation between the shape of bubble and the hydrodynamic force by means of numerical analysis and mathematical approach based on differential geometry. In particular, we make vortex dipoles impinge on the bubble in liquid and investigate the relation between the circulation of vortex dipoles and the feature of bubble shape after impingement such as a surface curvature singularity. This singularity can be estimated from the distribution of the curvature, its gradient and the Gauss-mapping of the bubble surface.

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Date submitted: 27 Jul 2005 Electronic form version 1.4