Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Experimental and Numerical Studies on Multibubble Interaction
CHAO-TSUNG HSIAO, XIAOZHEN LU, RAMKUMAR ANNASAMI, GEORGES CHAHINE, Dynaflow, Inc. — The behavior of multiple interacting bubbles can vary substantially from that of single bubble dynamics. We have conducted experiments and developed different levels of numerical tools for studying multiple bubble dynamics effects. In the experiments, multiple bubbles were generated simultaneously by spark and visualized using high speed video camera. The experimental results were then used to validate the numerical simulations obtained by 3DynaFS© and PhantomCloud©. 3DynaFS© uses the boundary element method, which is capable of predicting non-spherical bubbled deformation as well as multibubble interaction. PhantomCloud© is based on our earlier asymptotic expansion studies in which all bubbles are replaced with sources/sinks and dipoles whose intensities are determined by the underlying flow field and the presence of the other bubbles and their dynamics. The dynamics of each bubble is then recovered by a modified Rayleigh-Plesset equation and a center of the bubble equation of motion. In this approach, bubbles, which are punctual singularities, can interpenetrate without resulting in code failure, thus the "phantom" naming.

Chao-Tsung Hsiao
Dynaflow, Inc.

Date submitted: 20 Nov 2006 Electronic form version 1.4