Discrete Bubble Modeling for Cavitation Bubbles JIN-KEUN
CHOI, GEORGES CHAHINE, CHAO-TSUNG HSIAO, Dynaflow, Inc. — Dy-
naflow, Inc. has conducted extensive studies on non-spherical bubble dynamics
and interactions with solid and free boundaries, vortical flow structures, and other
bubbles. From these studies, emerged a simplified Surface Averaged Pressure (SAP)
spherical bubble dynamics model and a Lagrangian bubble tracking scheme. In this
SAP scheme, the pressure and velocity of the surrounding flow field are averaged on
the bubble surface, and then used for the bubble motion and volume dynamics calcu-
lations. This model is implemented using the Fluent User Defined Function (UDF)
as Discrete Bubble Model (DBM). The Bubble dynamics portion can be solved us-
ing an incompressible liquid modified Rayleigh-Plesset equation or a compressible
liquid modified Gilmore equation. The Discrete Bubble Model is a very suitable
tool for the studies on cavitation inception of foils and turbo machinery, bubble
nuclei effects, noise from the bubbles, and can be used in many practical problems
in industrial and naval applications associated with flows in pipes, jets, pumps, pro-
pellers, ships, and the ocean. Applications to propeller cavitation, wake signatures
of waterjet propelled ships, bubble-wake interactions, modeling of cavitating jets,
and bubble entrainments around a ship will be presented.

Jin-Keun Choi
Dynaflow, Inc.