Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Interaction between two spherical bubbles rising in a liquid DOMINIQUE LEGENDRE, YANNICK HALLEZ, IMFT, INTERFACE TEAM — The main goal of the present study is to provide a complete description of the interaction between two bubbles for moderate bubble Reynolds number ($20 \leq \mathrm{Re} \leq 500$, Re being based on the bubble diameter) and for positions described by the distance S ($2.5 \leq \mathrm{S} \leq 8$, S being the ratio between the distance of centre and the bubble diameter) and ($0^\circ \leq \theta \leq 90^\circ$) the angle formed between the line of centre and the horizontal. The value θ=0° corresponds to the situation of two bubbles moving side by side (Legendre, Magnaudet and Mougin 2003 JFM, 497,133-166) and θ=90° to the axis-symmetric situation of two bubbles moving in line (Yuan & Prosperetti 1994 JFM, 278, 325-349). The three-dimensional flow around two spherical bubbles moving in a viscous fluid is studied numerically by solving the full Navier-Stokes equations. The bubble surface is assumed to be clean so that the outer flow obeys a zero-shear-stress condition and does not induce any rotation of the bubbles. The nature of the interaction is studied and the wake of the leading bubble is found to play a significant role in the attraction/repulsion mechanism. A general model for pair interaction is proposed.

Dominique Legendre
IMFT

Date submitted: 04 Aug 2007 Electronic form version 1.4