

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Evolution and axial symmetry breaking of the toroidal vortex behind a clean bubble MINORI SHIROTA, National Institute of Advanced Industrial Science and Technology, KIYONORI KOGA, AYAKA SATO, Kyushu University, TOSHIYUKI SANADA, Sizuoka University, MASAO WATANABE, Hokkaido University — We experimentally observed the wake structure behind a rising clean bubble by using silicon oil solution of photochromic dye. Clean bubble condition was realized since both the dye and the silicon oil are non-polar. A single bubble was generated just below a colored region where the dye was activated by UV sheet light illumination. Once the bubble passed the colored part of the liquid, the bubble was accompanied by some portion of activated dye. Hence the flow structure in the rear of the single rising bubble was visualized. In this visualization method, we are able to distinguish the liquid portion trapped behind the bubble from the non-colored surrounding liquid that flows in the colored trapped portion. We precisely controlled the size of the bubble in order to observe how the size of the toroidal vortex behind a bubble evolves and the axial symmetry breaks. The relation between the in-flow of the surrounding liquid into the toroidal vortex and the bubble motion was studied in detail.

Minori Shirota
National Institute of Advanced Industrial Science and Technology

Date submitted: 30 Jul 2008

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