

DROPS AND BUBBLES SIMULATIONS USING VOLUME OF FLUID AND OCTREE ADAPTATIVE REFINEMENT

Stéphane Zaleski^{*†a)} and Stéphane Popinet^{**}

^{*} *UPMC Univ Paris 06, UMR 7190, Institut Jean Le Rond d'Alembert, F-75005 Paris, France.*

[†] *CNRS, UMR 7190, Institut Jean Le Rond d'Alembert, F-75005 Paris, France.*

^{**} *NIWA (National Institute of Water & Atmospheric Research), PO Box 14-901 Kilbirnie, Wellington, New Zealand.*

Summary We present salient aspects of the numerical methodologies that combine Volume of Fluid interface tracking and oct tree grid refinement. These have been developed over the past ten years and are now a relatively mature set of techniques allowing robust and highly accurate simulations of flows with interfaces. They are in particular the basis of the free computational fluid dynamics software Gerris.

Volume of Fluid method have gained increased accuracy with the advent of piecewise linear methods, which appear in the open literature in the late nineties. Truly second order methods such as ELVIRA soon follow, but their use in practice is still limited. Nevertheless, interface tracking using volume of fluid has become quite accurate and reliable.

Beyond interface tracking, the issue of surface tension has occupied researchers. The use of so-called height function methods has greatly increased the accuracy of surface tension computation. It has allowed the display of second order accuracy in several test cases. Difficult problems such as the quantitative reproduction of the Kelvin-Helmholtz instability growth rates are now possible.

^{a)} E-mail: stephane.zaleski@upmc.fr