Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Three-dimensional numerical simulations of three-phase flows[1]
DIMITRIOS PAVLIDIS, ZHIZHUA XIE, PABLO SALINAS, CHRIS PAIN, OMAR MATAR, Imperial College London — The objective of this study is to investigate the fluid dynamics of three-dimensional three-phase flow problems, such as droplet impact on a gas-liquid interface and bubble rising through a liquid-liquid interface. An adaptive unstructured mesh modelling framework is employed here to study three-phase flow problems, which can modify and adapt unstructured meshes to better represent the underlying physics of multiphase problems and reduce computational effort without sacrificing accuracy. The numerical framework consists of a mixed control volume and finite element formulation, a volume of fluid type method for the interface capturing based on a compressive control volume advection method and second-order finite element methods, and a force-balanced algorithm for the surface tension implementation, minimising the spurious velocities often found in such flow simulations. The surface tension coefficient decomposition method has been employed to deal with surface tension pairing between different phases via a compositional approach. Numerical examples of some benchmark tests and the dynamics of three-phase flows are presented to demonstrate the ability of this method.

[1]EPSRC Programme Grant, MEMPHIS, EP/K0039761/1

Omar Matar
Imperial College London

Date submitted: 27 Jul 2015 Electronic form version 1.4