Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Interface-tracking using a compressive advection method and a compositional modelling approach[1] DIMITRIOS PAVLIDIS, JEFFERSON GOMES, CHRISTOPHER PAIN, OMAR MATAR, Imperial College London — We describe progress on a consistent approach for interface- tracking in which each component, representing a different phase/fluid, has a sum of unity. Our aim is to develop a general multiphase modelling approach based on fully-unstructured meshes that can exploit the latest mesh adaptivity methods, and in which each fluid phase may have a number of components that are assumed to be immiscible in this work although not a requirement of the approach. The method is based on a new mixed finite element pair, the P1DG-P2 element, in which pressure has a quadratic variation and velocity a discontinuous linear variation with the discontinuity between elements. This element allows us to represent key balances such as hydrostatic balance exactly assuming a linear variation in buoyancy. This means that on unstructured meshes we do not have problems representing these key balances that can result in large pressure gradients which, in turn, generate large spurious velocities that can dominate the solution. We apply the method to a series of benchmark problems that demonstrate the approach and show that the method works for at least three different fluids, and that it avoids putting a priority on resolving any of these fields or components.

[1]EPSRC Programme Grant EP/K003976/1

Omar Matar
Imperial College London

Date submitted: 03 Aug 2012 Electronic form version 1.4