Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

High-Order Finite-Difference Solution of the Poisson Equation with Interface Jump Conditions ALEXANDRE MARQUES, JEAN-CHRISTOPHE NAVE, RODOLFO ROSALES, Massachusetts Institute of Technology — The Poisson equation with jumps in function value and normal derivative across an interface is of central importance in the numerical study of multi-phase flows. In this presentation we introduce a method to obtain a high-order solution to such problem. The method is based on the construction of corrector functions that provide accurate extensions of the jump conditions around the interface. The accuracy of the method results from the combination of Hermite interpolants and a high-order representation of the interface using the gradient-augmented level-set technique. These corrector functions can be easily incorporated in standard finite-difference discretization schemes, only generating additional terms to the right-hand side of the system. As a result, computational cost is not significantly affected when compared to the first order accurate ghost fluid method.

Alexandre Marques
Massachusetts Institute of Technology

Date submitted: 07 Aug 2009 Electronic form version 1.4