Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

A new Ghost Fluid approach on non-graded adaptive cartesian grid for solving the Poisson equation with jump conditions enforced on an irregular interface ASDIS HELGADOTTIR, FREDERIC GIBOU, UCSB — A poisson solver on a non-graded adaptive Cartesian grid, for the poisson equation with jump enforced at an irregular interface, is presented. A Ghost Fluid method, similar to that presented by Liu *et al.* (in JCP:160(2000), 151 - 178) is used, with two main differences: 1) the uniform grid is replaced with optimum quad tree (2D) and octree (3D) structures, which significantly saves computational time and memory usage, 2) the jump in the normal derivative is enforced analytically (or more so by a numerical integration of the analytical term) instead of being approximated with finite difference as done by Liu *et al.*. The method is simple and results in a positive definite matrix that can easily be solved with black box solvers.

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Date submitted: 05 Aug 2009 Electronic form version 1.4