1046-35-1284 **Jae-Seok Huh*** (jshuh@acm.caltech.edu), 207 Firestone, Applied and Computational Math, California Institute of Technology, MC 217-50, 1200 E. California Boulevard, Pasadena, CA 91125.

Exact subgrid interface correction (ESIC) schemes for elliptic interface problems.

We present the ESIC, a non-conforming finite element method for second order elliptic interface problems, where discontinous coefficients and singular sources on the interface may give rise to jump discontinuities in either the solution or its normal derivative.

The ESIC satisfies the prescribed jumps by recasting the given singular problem into a regular problem with additional correction sources on the right-hand-side; these are solved on a fixed background mesh providing accurate subgrid resolution of the discontinuities.

To construct this correct function, we utilize closest point extensions and an implicit interface signed distance function representation; the resulting function is supported only on the interface elements, represented by the regular basis functions, and bounded independently of the interface location with respect to the background mesh. For a constant second-order coefficient, the singular function regularization is straightforward, and the resulting left-hand side is an instability-free regular problem. The influence of the regularization appears solely on the right-hand side. For more general discontinuous second order coefficients, a normalization is invoked which introduces a constraint equation on the interface. (Received September 15, 2008)