A Multigrid Algorithm for Immersed Interface Problems

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Many physical problems involve interior interfaces across which the coefficients in the problem, the solution and or its derivatives, the flux, or the source term has jumps. These interior interfaces may or may not align with a underlying Cartesian grid. Zhilin Li, in his dissertation, showed how to discretize such problems using only a Cartesian grid and the known jump conditions to second order accuracy. In this talk, we describe how to apply the multigrid algorithm in this context. In particular, the restriction, interpolation, and coarse grid problem will be described and numerical results will be given for several groundwater flow problems.