1038-65-297 **David P. Nicholls*** (nicholls@math.uic.edu), Dept. of Math, Stat, and Comp. Sci., University of Illinois at Chicago (MC 249), 851 South Morgan Street, Chicago, IL 60607, and **T. Binford**, **N. Nigam** and **T. Warburton**. *Exact Non-Reflecting Boundary Conditions on General Domains and hp-Finite Elements.*

For exterior scattering problems one of the chief difficulties arises from the unbounded nature of the problem domain. Inhomogeneous obstacles may require a volumetric discretization, such as the Finite Element Method (FEM), and for this approach to be feasible the exterior domain must be truncated and an appropriate condition enforced at the far, artificial, boundary. An exact, non-reflecting boundary condition can be stated using the classical DtN-FE method if the Artificial Boundary's shape is quite specific, circular or elliptical. Recently, this approach has been generalized to permit quite general Artificial Boundaries which are shaped as perturbations of a circle resulting in the "Enhanced DtN-FE" method. In this talk we discuss extensions of this method to a two-dimensional FEM featuring high-order polynomials in order to realize a high rate of convergence. This is more involved than simply specifying high-order test and trial functions as now the scatterer shapes and Artificial Boundary must be faithfully represented. This entails boundary elements which conform (to high order) to the true boundary shapes. As we show, this can be accomplished and we realize an arbitrary order FEM without spurious reflections. (Received February 12, 2008)