1077-65-2220 **Anna L. Mazzucato**, **Victor Nistor** and **Qingqin Qu*** (qu@math.psu.edu), 109 McAllister Building, University Park, PA 16802. *A non-conforming Generalized Finite Element Method for Transmission Problems.*

We obtain "h^m-quasi-optimal rates of convergence" for transmission (or interface) problems on domains with curved boundaries using a non-conforming Generalized Finite Element Method (GFEM). The sequence of approximation spaces (GFEM spaces) S_μ, are assumed to satisfy: (1) nearly zero boundary and interface matching conditions, and (2) approximability conditions. Under these conditions, if $u_\mu \in S_\mu$, $\mu \geq 1$, is a sequence of Galerkin approximations of the solution u to our transmission problem, then $\|u - u_\mu\|_{\hat{H}^1(\Omega)} \leq C h_\mu^m \|f\|_{\hat{H}^{m-1}(\Omega)}$, where the *broken Sobolev spaces* $\hat{H}^p(\Omega)$ are defined by $\hat{H}^p(\Omega) := \{u \in L^2(\Omega), u \in H^p(\Omega_j), \text{ for } j = 1, \ldots, K, \Omega = \cup_j \Omega_j\}$ with norm $\|u\|^2_{\hat{H}^p(\Omega)} = \sum_j \|u\|^2_{H^p(\Omega_j)}$. We give an explicit construction of GFEM spaces S_μ for which our two assumptions are satisfied, and hence for which the h^m-quasi-optimal rates of convergence hold. We also present some numerical experiments to demonstrate the theoretical results. (Received September 21, 2011)