1079-65-179 **Peter Monk** and **Jiguang Sun*** (jsun@desu.edu), ETV 227, Delaware State University, 1200 N. DuPont Hwy., Dover, DE 19901. *Finite Element Methods for Maxwell's Transmission Eigenvalues.*

The transmission eigenvalue problem plays a critical role in the theory of qualitative methods for inhomogeneous media in inverse scattering theory. Efficient computational tools for transmission eigenvalues are needed to motivate improvements to theory, and, more importantly as part of inverse algorithms for estimating material properties. In this talk, we propose two finite element methods to compute a few lowest Maxwell's transmission eigenvalues which are of interest in applications. Since the discrete matrix eigenvalue problem is large, sparse, and, in particular, non-Hermitian due to the fact that the problem is neither elliptic nor self-adjoint, we devise an adaptive method which combines the Arnoldi iteration and estimation of transmission eigenvalues. Exact transmission eigenvalues for balls are derived and used as a benchmark. Numerical examples are provided to show the viability of the proposed methods and to test the accuracy of recently derived inequalities for transmission eigenvalues. (Received January 11, 2012)