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Efficient Boundary Integral Method for Quantum Billiards HARALD G.L. SCHWEFEL, Max Planck Research Group, Optics, Photonics & Information, Erlangen, Germany, HAKAN E. TÜRECI, Center for Theoretical Physics, Sloane Physics Laboratory, Yale University, New Haven, CT , A. DOUGLAS STONE, Department of Applied Physics, Yale University, New Haven, CT — Calculating highly excited eigenvalues of the Laplace equation and their corresponding eigenfunctions are of great current interest in many areas. We present an efficient algorithm based on a novel Fredholm formulation of the Laplace eigenvalue problem, in the spirit of the scattering quantization method proposed by the authors in the context of the basis function expansion technique.[1] We also point out the connection to the scaling eigenfunctions[2] and show how this method can be generalized to dielectric cavities.

[1]H. E. Tureci, H. G. L. Schwefel, Ph. Jacquod, and A. Douglas Stone. Modes of wave-chaotic dielectric resonators. *Progress In Optics*, 47, 2005.
[2]A. H. Barnett. Quasi-orthogonality on the boundary for Euclidean Laplace eigenfunctions. *submitted, Comm. Pure Appl. Math.*, 2004

Harald G.L. Schwefel
Max Planck Research Group, Optics, Photonics & Information, Erlangen, Germany

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