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Fast and Robust Computation of Laplacian Eigenvalues for Arbitrary Planar Domains.

The Laplacian spectrum of general multiply-connected planar domains is challenging to obtain with high accuracy. We achieve 12-digit accuracy using the determinant of a combined field integral equation discretized with a Nyström scheme, computed by a fast direct solver at a cost of $O(N \log N)$. On a complicated domain with $N = 3 * 10^4$ boundary nodes, it takes 17 min per eigenvalue found. Joint work with Alex Barnett. (Received September 15, 2014)