1085-49-278 **Braxton Osting*** (braxton@math.ucla.edu), 405 Hilgard Avenue, Los Angeles, CA 90095, and **Chiu-Yen Kao** (chiu-yen.kao@claremontmckenna.edu), Claremont, CA 91711. *Minimal convex combinations of sequential Laplace-Dirichlet eigenvalues.*

Minimal convex combinations of sequential Laplace-Dirichlet eigenvalues

We propose a computational approach based on the level set method to solve shape optimization problems where the objective function is dependent on the Laplace-Dirichlet eigenvalues of the domain. The approach is applied to the parameterized problem of minimizing the convex combination of sequential Laplace-Dirichlet eigenvalues. We show that as a function of the combination parameter, the optimal value is non-decreasing, Lipschitz continuous, and concave and that the minimizing set is upper hemicontinuous. The domains which minimize the first few Laplace-Dirichlet eigenvalues are known analytically and/or have been studied computationally and it is known that the optimal solution for some values have multiply connected components. Our computations reproduce these previous results for the appropriate parameter values and extend these results, effectively capturing intermediate topology changes. The results are also compared to values obtained analytically for rectangular and elliptical shapes and to values for domains with nearly-circular boundary. (Received September 11, 2012)