1021-49-101 **Steve Rosencrans** and **Xuefeng Wang*** (xdw@math.tulane.edu), Department of Mathematics, Tulane University, New Orleans, LA 70118. *Suppression of the Dirichlet eigenvalues of a coated body.*

We consider the problem of protecting from overheating the interior of anisotropically heat-conducting bodies whose boundary is maintained at a high temperature. The bodies are composites consisting of a thin anisotropic insulating coating surrounding an isotropically conducting interior (e.g., a space shuttle painted with an insulator). Denote by A the thermal tensor (matrix) of the coated body and consider the Dirichlet eigenvalues of the elliptic operator $u \mapsto -\nabla \cdot (A \nabla u)$ on the coated body. The eigenfuction expansion of the interior temperature shows that small eigenvalues favor insulation of the interior. The focus of this paper is estimation of the elliptic eigenvalues and qualitative description of the eigenfunctions using *only* the eigenvalues of A, the scalar conductivity of the uncoated body, and certain scalar characteristics of the geometry of the uncoated body. We study the effect of small matrix eigenvalues, small thickness of the coating, and their interplay. If the thermal tensor of the coating is spatially varying, and optimally configured so that the minimum eigenvalue has eigenvector normal to the body (at all boundary points, and that this persists into the coating) only that minimum eigenvalue need be small. (Received August 29, 2006)