1077-35-538 **Xinfu Chen**, Department of Mathematics, University of Pittsburgh, Pittsburgh, PA 15260, **Cody Pond**, Department of Mathematics, Tulane University, New Orleans, LA 70118, and **Xuefeng Wang*** (xdw@tulane.edu), Department of Mathematics, Tulane University, New Orleans, LA 70118. *Effective Boundary Conditions Resulting from Anisotropic and Optimally Aligned Coatings: the Two Dimensional Case.*

Of concern is a thermally conducting body insulated by a thin anisotropically conducting coating. The coating is "optimally aligned"in the sense that the normal vector inside the coating is always an eigenvector of the thermal tensor. We study the effects of the coating by investigating the limiting behavior of solutions u of the heat equation with either Dirichlet or Neumann boundary condition imposed on the outer boundary of the coating, as the thickness of the coating shrinks to zero. In the two-dimensional case, we find the complete list of "effective boundary conditions"satisfied by the limit of u on the boundary of the uncoated body. This list contains not only the usual Dirichlet, Neumann and Robin boundary conditions, but also some new and even nonlocal ones involving the Dirichlet-to-Neumann mapping, the Hilbert transformation and the Laplace-Beltrami operator. We also prove that u converges to its limit in various norms that include the L^2, the Sobolev and the Hölder ones. During the course of this study, we establish a Schauder theory for the regularity of weak solutions of general second order parabolic equations near an interface where the "transmission condition"is satisfied. (Received September 06, 2011)