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A Novel Theory of AC Contact Resistance[1] FOIVOS ANTOULINAKIS, Y. Y. LAU, University of Michigan — Electrical contact is an important issue to high power microwave sources, pulsed power systems, field emitters, thin film devices and integrated circuits, and interconnects, etc. Contact resistance, and the enhanced ohmic heating that results, have been treated mostly under steady state (DC) condition. In this paper, we consider the vastly more complex problem of AC contact resistance. We consider a simple geometry, namely, that of two semi-infinite slab conductors of different thicknesses and different electrical properties joint at z = 0. In the DC case, this model was solved exactly by Zhang and Lau [1]. Here, we present an exact solution under AC condition. New features that accompany AC condition, such as the resistive skin effect, inductive, and capacitive effects, as well as radiation losses will be presented. Both metal and semi-conductor contacts are considered. Scaling laws for the AC contact resistance as a function of frequency have been constructed for several cases.

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