Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Spreading Resistance on Thin Film Contacts[1] PENG ZHANG, Y.Y. LAU, D. HUNG, R.M. GILGENBACH, University of Michigan - Ann Arbor — Electrical contact [1] is important to wire-array z-pinches, metal-insulator-vacuum junctions, and high power microwave sources, etc. Contact problems account for 40 percent of all electrical failures, from small scale consumer electronics to large scale defense and aerospace systems. The crowding of the current lines at contacts leads to enhanced localized heating, a measure of which is the spreading resistance (R_s). For a microscopic area of contact (the "a-spot" [1]) on a thin film, we calculate R_s in both Cartesian and cylindrical geometries [2]. In the limit of small film thickness, h, the normalized thin film spreading resistance converges to the finite values, 2.77 for the Cartesian case and 0.28 for the cylindrical case. These same finite limits are found to be applicable to the a-spot between bulk solids in the high frequency limit if the skin depth is identified with h. Extension to a general a-spot geometry is proposed [2].

[1] R. Holm, Electric Contacts, 4th ed., Springer (1967).
[2] P. Zhang et al., IEEE Trans. Electron Devices **59**, 1936 (2012).

[1]Supported by an AFOSR grant FA9550-09-1-0662, L-3, and Northrop-Grumman.

Peng Zhang
University of Michigan - Ann Arbor

Date submitted: 13 Jul 2012 Electronic form version 1.4