Electrical Contact Resistance with Dissimilar Materials[1] PENG ZHANG, Y.Y. LAU, MATTHEW GOMEZ, DAVID FRENCH, R.M. GILGENBACH, University of Michigan - Ann Arbor, WILKIN TANG, Air Force Research Lab — Electrical contact is important to wire-array Z pinches [1], high power microwave sources, and metal-insulator-vacuum junction, etc. It is also an important issue to ITER. Because of the surface roughness on a microscopic scale, true contact between two pieces of conductors occurs only at the asperities of the contacting surfaces, leading to contact resistance. In this paper, Holm's basic a-spot theory [2] for contact resistance is vastly extended to higher dimensions with dissimilar materials [3]. Scaling laws are constructed for both Cartesian and cylindrical channels. The theory was validated by simulations and experiments in several limiting cases [4]. [1] D. A. Chalenski et al., Phys. Plasmas 16, 082707 (2009); M. R. Gomez et al., Rev. Sci. Inst. 79, 093512 (2008). [2] R. Holm, Electric Contact (Springer-Verlag, 1967). [3] P. Zhang and Y. Y. Lau, J. Appl. Phys. (July 2010). [4] M. R. Gomez et al., Appl. Phys. Lett. 95, 072103 (2009).

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