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Electric Field Screening by the Proximity of Two Knife-Edge Field Emitters of Finite Width[1] P. WONG, University of Michigan, Ann Arbor MI, W. TANG, Air Force Rsch Lab-Albuquerque, Y.Y. LAU, University of Michigan, Ann Arbor MI, B. HOFF, Air Force Rsch Lab-Albuquerque — Field emitter arrays have the potential to provide high current density, low voltage operation, and high pulse repetition for radar and communication. It is well known that packing density of the field emitter arrays significantly affect the emission current [1]. Previously we calculated analytically the electric field profile of two-dimensional knife-edge cathodes with arbitrary separation by using a Schwarz-Christoffel transformation [2]. Here we extend this previous work to include the finite width of two identical emitters. From the electric field profile, the field enhancement factor, thereby the severity of the electric field screening, are determined. It is found that for two identical emitters with finite width, the magnitude of the electric field on the knife-edge cathodes depends strongly on the ratio h/a and h/r, where h is the height of the knife-edge cathode, $2a$ is the distance between the cathodes, and $2r$ represents their width. Particle-in-cell simulations are performed to compare with the analytical results on the emission current distribution.

[1] L. Nilsson, et al., Appl. Phys. Lett. 76, 2071 (2000).
[2] W. Tang, D. Shiffler and K.L. Cartwright, J. Appl. Phys. 110, 034905 (2011).

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