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Experimental and simulation study of electric field screening of carbon fiber field emitters WILKIN TANG, DON SHIFFLER, Air Force Research Lab, MATTHEW LACOUR, KEN GOLBY, SAIC, TIM KNOWLES, Energy Science Laboratories Inc. — 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 current¹ because individual emitters screen each other from the imposed electric field. Previous experiments were conducted with 1000s of field emitters which makes the analysis of electric field screening difficult. Here we describe experiments with small numbers of emitters—a dual-cathode and four-cathode configuration.² The experiments utilize carbon fiber field emitters (two and four) with variable spacing to investigate the effect of electric field screening on current emission. Analytic model and Particle-in-cell simulations are performed to compare with the experiments.

¹L. Nilsson, O. Groning, C. Emmenegger, O. Kuettel, E. Schaller, L. Schlapbach, H. Kind, J. M. Bonard, and K. Kern, "Scanning Field Emission From Patterned Carbon Nanotube Films", *Appl. Phys. Lett.* 76, 2071 (2000).

²W. Tang, D. Shiffler, K. Golby, M. LaCour and T. Knowles, "Experimental Study of Electric Field Screening by the Proximity of Two carbon Fiber Cathodes", *J. Vac. Sci. Technol. B* 30, 061803 (2012).

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