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Electric field distribution on knife-edge field emitters RYAN MILLER, University of Wisconsin, YUE YING LAU, University of Michigan, JOHN BOOSKE, University of Wisconsin — Of critical importance to advanced High Power Microwave (HPM) generators is the development and understanding of robust cold cathodes with low turn-on electric fields. Recent interesting candidates include ridged metallic cathodes fabricated by either laser ablation or other micro-fabrication methods [1]. We use conformal mapping to calculate the electric field on a knife-edge cathode. We find that the field enhancement factor scales approximately as the square root of the height-width ratio of the knife-edge [2]. An analytic approximation for the divergent electric field in the immediate vicinity of the sharp edge is derived. A smaller knife-edge placed on top of a larger one demonstrates that the composite field enhancement factor is approximately equal to the product of the field enhancement factor of the individual knife-edges. This proves the conjecture [3] on multiplication of field enhancement factors for one special case. This work was supported by AFOSR/MURI and by AFRL.

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