Limiting current from a metallic ideal edge attached to a dielectric edge

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An analytic expression for the limiting current in the vicinity of metallic and dielectric edges is developed. It is shown that the basic $V^{3/2}$ law remains valid and, for large dielectric coefficients ($\epsilon_r > 5$), the average limiting current density is not explicitly dependent on the angle of the metallic edge. Moreover, the limiting current depends primarily on the typical curvature of the emitter and not only on the diode gap. In general, the field curvature is reduced by the space charge and, in many cases, the singularity associated with the edge under vacuum conditions is eliminated. The *azimuthal* curvature parameter is identical to that in a planar configuration ($p = 4/3$), whereas for the *radial* curvature parameter, an analytic expression is developed. © *1999 American Institute of Physics.* [S0003-6951(99)01346-7]