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Note on using the principal Schottky-Nordheim barrier function v(x)

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This note suggests improvements in presenting field electron emission (FE) theory. It relates to the so-called principal Schottky-Nordheim (SN) barrier function "v" used in Murphy-Good-type FE theory. I argue that: (1) we should separate the mathematics of v from its applications in tunnelling theory; (2) we need to change the independent variable used; and (3) we can improve the notation.
It is now known that v is a special mathematical function that is a very special solution of the Gauss Hypergeometric Differential Equation. Denote the independent variable in this equation by x, and call x the Gauss variable. The best mathematical convention is to write v(x), with "v" typeset upright (like "sin" or "Ai"). [Previously I wrote v(l'), which is a clumsy notation derived from the theory of complete elliptic integrals. This change is just a re-labelling.]
When this mathematics is applied to tunnelling through an SN barrier, one can either put x=f, where f is the scaled barrier field (which is the modern approach), or put x=y2, where y [=f1/2] is the Nordheim parameter (which is the historical approach). This poster re-states the scientific reasons why the modern approach is considered superior.

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