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Update on the status of field electron emission theory

Monday, 20 March 2017 16:00 (30 minutes)

This presentation aims to provide brief updates on our current understanding of the theory of field electron emission (FE), on progress in putting FE theory onto a more scientific basis, and on progress in interpreting measured FE current-voltage [Im(Vm)] characteristics. Possibly the main use of FE theory in vacuum breakdown is to provide good formulae for use in simulators, with some assessment of their likely reliability. Other topics to be covered that may be of interest are issues relating to: (1) the concept of the emitter's electrical surface and its location; (2) the definition of field enhancement factors (FEFs), and the prediction of FEF values; (3) alternative definitions of emission area; and (4) the extraction of area and FEF estimates from Im(Vm) data. Warnings will be given that large parts of current FE literature are somewhat unreliable, with defective equations often stated, and spuriously large FEF values often reported (the latter can often be detected by an "orthodoxy test"). If time permits, some of the immediate and longer-term tasks necessary to improve both our understanding of FE theory and its clear presentation, and some of the obstacles, will be described.

Type of contribution

Oral

session

Field Emission

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