Abstracts

Electromagnetic Potentials and Field Expansions for Plasma Radiation in Waveguides

R.E. Collin. "Electromagnetic Potentials and Field Expansions for Plasma Radiation in Waveguides." 1965 Transactions on Microwave Theory and Techniques 13.4 (Jul. 1965 [T-MTT]): 413-420.

In order to calculate the raditaion from plasmas placed in waveguides it is necessary to know the field produced by arbitrarily moving charged particles in a waveguide. In this paper modal expansions for the vector and scalar potentials due to arbitrarily moving charged particles in a waveguide are derived and provide the extension of the Lienard-Wiechert potentials to a waveguide environment. In addition, for a plasma filled waveguide, a modal expansion is given of the electric field directly in terms of mode coupling with the charge motion. Expressions for the spectral distribution of the radiation are given, both in general and for cyclotron radiation. Some specific results for the H/sub 10/ mode excited in a rectangular guide by cyclotron motion are also presented.

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