VIII-1. ELECTROMAGNETIC MOMENTUM AS A TOOL IN MICROWAVE ANALYSIS

John Brown (Invited)

University College, London, England

The relationship between electromagnetic momentum and mechanical forces has frequently been studied in relation to the design of wattmeters using radiation pressure, and to the possible steering of space craft using the same principle. The general theorem of conservation of momentum provides a powerful theoretical tool in mechanics, and the analysis reported in this paper is an attempt to use a similar momentum conservation principle in the analysis of waveguide problems. The basic theorem which is required was reported many years ago by Stratton, and this can be used to determine an upper limit for the value of the reflection coefficient at the junction between two dissimilar waveguides. Particular examples of such waveguide junctions may be solved exactly by using the Wiener-Hopf method for solving integral equations, and it appears that in such cases an exact expression for the magnitude of the reflection coefficient may be deduced relatively simply from momentum arguments.

Other possible situations in which the momentum principle may be helpful include coupling between different waveguide modes, caused for example by perturbations of the waveguide surface, and preliminary work on such problems will be mentioned.