Composite Inductive Posts in Waveguide — A Multifilament Analysis

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Abstract — A multifilament moment solution for the analysis of composite dielectric posts in rectangular waveguide is presented. This method permits the analysis of inductive posts composed of disparate regions, each with its own homogeneous complex permittivity. The solution uses the fields generated by sets of fixed-amplitude current filaments to simulate both the field scattered by the posts and the field inside every homogeneous region comprising the posts. Point matching the electric and magnetic fields on the boundaries between regions of different permittivity yields the as yet unknown amplitudes for the current filaments. These currents can in turn be used to calculate field-related parameters of interest such as the scattering matrix and the equivalent circuit parameters. Inductive posts of any shape, composition, size, location, and number can be handled by this method accurately and with very good numerical efficiency. The results obtained are in good agreement with the few cases for which data are available. They also behave well in the limiting cases studied. The solution is further applied to other situations for which no experimental or calculated results are known.