

# Analysis of Inductive Dielectric Posts in Rectangular Waveguide

YEHUDA LEVIATAN, MEMBER, IEEE, AND GAD S. SHEAFFER

**Abstract**—A rapidly converging moment solution for the complete analysis of homogeneous dielectric posts of the inductive type in rectangular waveguide is presented. The moment method approach uses filamentary currents to simulate both the field scattered by the post and the field inside the post and in turn point-matches the continuity conditions for the tangential components of the electric and magnetic fields across the post surface. The procedure is simple to execute and is general in that inductive posts of arbitrary smooth shape, size, location, and number, lossless as well as lossy, can be handled effectively. Data are given and compared with the few cases for which approximate results are available. The technique is further applied to other situations where no experimental data or other analytic results are available.

eral in that inductive posts, lossless as well as lossy, of arbitrary smooth shape, size, location, and number can be handled effectively. The study of dielectric posts is not solely of academic interest; it has practical importance as well. Nowadays, several high-permittivity, high- $Q$ , temperature-stable, low-cost ceramic compositions have been developed. With this combination of desirable properties, they can replace conventional copper and Invar waveguide filters in almost all applications. In fact, dielectric filters have already been used in radio system ranging from 1.7 to 11 GHz and their application is expected to grow rapidly