The Propagation of Guided Periodic Cylinder Structure

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Abstract

In this paper, an approach using the mode-matching technique in conjunction with the Floquet theorem is employed to analyze the periodically loaded corrugated cylindrical waveguides. The cylindrical waveguide under analysis consists of a periodically loaded corrugated center metallic cylinder covered with layered dielectrics. In addition, the geometry and the number of layers of the corrugation can be arbitrary. The outermost layer of the cylindrical periodic structure can be a shielding conductor. To analyze, we represent the electromagnetic fields in each layer with the appropriate eigenmode functions. Then boundary conditions at all interfaces are imposed to obtain a system characteristic equation, from which the propagation constant of the whole periodic structure can be solved. In this work, effects of the period, width, and depth of the corrugation as well as the dielectric constants of the cover layers on the dispersion property are studied. The location of the pass band and stop band of the periodically loaded corrugated cylindrical waveguides are also examined.

Key words：Floquet theorem;Mode matching;Periodic corrugation