

This paper presents a full-wave modal analysis of transverse corrugated circular waveguides with stepped ridges accompanied by segmented grooves and a waveguiding core that is stratified into concentric layers. The method is validated with the known results from literature and those generated by independent solvers. Its strengths over contemporary numerical alternatives such as the finite-element method (FEM) are also portrayed. Such a topology facilitates the study of ways for reducing metal losses and enhancing the aperture efficiency of the operational mode, especially in high-power high-frequency microwave applications, such as by implementing dielectric linings within the grooves or ceramic coatings over the surface of the corrugations, constituting just two cited examples amongst the many other forms of measures for potential performance enhancement which the technique is able to treat.