Abstracts

A photonic bandgap (PBG) structure for guiding and suppressing surface waves in millimeter-wave antennas

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Periodic and regular metal posts, a photonic bandgap (PBG) structure for guiding surface waves in a parallel-plate waveguide is proposed. The isotropic PBG structure is applied to the design of an asymmetric parallel-plate waveguide Luneburg lens (APWLL). The relation between the dimensions of the metal posts and the required refraction index in the lens is derived with transmission-line theory and the transverse resonance method. Different lattices for the entire lens are also investigated. For verification, an antenna for a 76.5 GHz adaptive-cruise control radar is fabricated, consisting of an APWLL, a primary feed, and symmetric corrugated flares to improve the property of the antenna in elevation. Measured results verify the PBG structure design in the APWLL.

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