ABSTRACT

Surface waves on truncated periodic arrays are examined. The surface waves to be studied are guided by the perfectly-conducting elements of the array itself, and are to be distinguished from the dielectric slab-guided surface waves encountered elsewhere in the literature. Typically, the surface wave currents are comparable in magnitude to the Floquet currents excited in the corresponding infinite planar array.

The conditions under which a surface wave resonance may arise are given. The associated propagation constants are found from the scan impedance of the infinite array. The surface wave currents are extracted from the finite by infinite array method of moments solution using a least squares algorithm. A model for predicting the total surface waves is established. The model equations are written in terms of excitation and reflection coefficients and three methods of calculating these quantities are presented.

Arrays whose elements are parallel and orthogonal to the two edges are considered. The effect of a ground plane behind the array is examined. The efficacy of resistive edge treatments in the suppression of surface waves is investigated, and the existence of waveguide-like modes between two parallel periodic arrays operating near the resonant frequency is demonstrated.