A Scattering Problem for a Local Perturbation of an Open Periodic Waveguide

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Abstract

In this paper we consider the propagation of waves in an open waveguide in $\mathbf{R}\hat{}2$ where the index of refraction is a local perturbation of a function which is periodic along the axis of the waveguide and equal to one outside a strip of finite width. Motivated by the limiting absorption principle (proven in an ealier paper by the author for the case of an open waveguide in the half space) we formulate a radiation condition which allows the existence of propagating modes and prove uniqueness, existence, and stability of a solution. In the last part we investigate the decay properties of the radiating part in the direction of periodicity and orthogonal to it.

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