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ABSENCE OF EIGENVALUES OF THE ACOUSTIC PROPAGATOR IN DEFORMED WAVE GUIDES

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ABSTRACT. We prove that the acoustic propagator for deformed wave guides has no positive eigenvalues.

Introduction. The propagation of acoustic waves in a deformed wave guide with speed of propagation $c(x,y)$ is described by the equation

$$\frac{\partial^2 u}{\partial^2 t} - c^2(x,y)\Delta u = 0, \tag{1.1}$$

where $u(x,y,t)$ is a real valued function of $x \in \mathbf{R}^n, y \in \mathbf{R}, t \in \mathbf{R}$, where

$$\Delta = \sum_{i=1}^{n} \frac{\partial^2}{\partial^2 x_i} + \frac{\partial^2}{\partial^2 y}, \tag{1.2}$$

and where $c(x,y)$ is a measurable real valued function of $\mathbf{R}^{n+1}$ that satisfies

$$0 < c_1 \leq c(x,y) \leq c_2, \tag{1.3}$$

for a.e., (x,y), and c_1, c_2 positive constants.

The deformed wave guide is a perturbation of a perfect wave guide whose velocity profile, $c_0(y)$, is a measurable real valued function of y only, and satisfies (1.3). The corresponding wave equation is

$$\frac{\partial^2}{\partial^2 t} u - c_0^2(y)\Delta u = 0. \tag{1.4}$$

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