Jäger, W. and Saitō, Y.
Osaka J. Math.
34 (1997), 267–301

THE REDUCED WAVE EQUATION IN LAYERED MATERIALS

WILLI JÄGER and YOSHIMI SAITŌ[1]

(Recieved March 12, 1996)

1. Introduction

The mathematical theory of wave in layered media is still posing interesting mathematical problems even in the linear, stationary case.

In Jäger-Saitō [9] and [8], we studied the spectrum of the reduced wave operator

$$H_0 = -\mu_0(x)^{-1}\Delta, \tag{1.1}$$

where $\mu_0(x)$ is a simple function which takes a two positive values μ_{01} and μ_{02} on Ω_1 and Ω_2 respectively. Here Ω_ℓ, $\ell = 1, 2$, are open sets of $\mathbf{R}^N$ such that

$$\begin{cases} \Omega_1 \cap \Omega_2 = \emptyset, \\ \overline{\Omega_1} \cup \Omega_2 = \Omega_1 \cup \overline{\Omega_2} = \mathbf{R}^N, \end{cases} \tag{1.2}$$

$\overline{\Omega_\ell}$ being the closure of Ω_ℓ. Under a new condition on the separating surface $S = \partial\Omega_1 = \partial\Omega_2$, we have established the limiting absorption principle for H_0 which implies that H_0 is absolute continuous. Our condition is satisfied, for example, for the case where S is a cylinder.

In this work we are going to extend the results in [9] to the multimedia case, the case where $\mu_0(x)$ can take finitely or infinitely many values (see §2). The limiting absorption principle will be established and, again, the operator H_0 is absolute continuous. Also we shall consider short-range or long-range perturbation of H_0, that is, we shall study the operator

$$H = -\mu(x)^{-1}\Delta, \tag{1.3}$$

where

$$\mu(x) = \mu_0(x) + \mu_1(x) \tag{1.4}$$

[1]The second author was partly supported by Deutche Forschungs Gemeinschaft through SFB 359.