Ikawa, Mitsuru

On the poles of the scattering matrix for two strictly convex obstacles: An addendum.

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The object of the paper is to clarify the relationship between an obstacle $\mathcal{O}$ in $\mathbb{R}^3$ and the poles of the associated scattering matrix $\mathcal{S}(z)$ (in the sense of Lax and Phillips). Assume $\mathcal{O}=\mathcal{O}_1\cup\mathcal{O}_2$, $\bar{\mathcal{O}}_1\cap\bar{\mathcal{O}}_2=\emptyset$ and $\mathcal{O}_i$ strictly convex open bounded sets with smooth boundaries Γ_i. Let $\mathcal{S}(\sigma)$ $(\sigma\in\mathbb{R})$ be the scattering matrix associated to the acoustic problem $\square u(x,t)=0$ in $(\mathbb{R}^3\setminus\bar{\mathcal{O}})\times\mathbb{R}$ and $u(x,t)=0$ on $(\Gamma_1\cup\Gamma_2)\times\mathbb{R}$. Hence $\mathcal{S}(\sigma)$ is a unitary operator in $L^2(S^2)$ for all $\sigma\in\mathbb{R}$. It is known that $\mathcal{S}$ extends to an operator valued function $\mathcal{S}(z)$ analytic in Im z< 0 and meromorphic on the whole plane. It is shown that there are strictly positive constants c_0, c such that, denoting $z_j=ic_0+\pi\cdot j[dist(\mathcal{O}_1,\mathcal{O}_2)]^{-1}$, (j$\in\mathbb{Z}$), $\mathcal{S}$ has at least one pole in $\{z\in\mathbb{C}||z-z_j|\le c(1+|j|)^{-1/2}\}$ for all large $|j|$.

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MSC:

35P25 Scattering theory for PDEs
47A40 Scattering theory of linear operators
78A45 Diffraction, scattering
76Q05 Hydro- and aero-acoustics
35L05 Wave equation

Keywords:

obstacle; poles; scattering matrix; acoustic problem

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