INVISIBLE INCLUSIONS AND A SPECTRAL $\mathbb{R}$-LINEAR PROBLEM

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An eigenvalue $\mathbb{R}$-linear problem arisen in the theory of invisible and neutral inclusions is discussed by a method of integral equations. Consider non-overlapping simply connected domains D_k ($k = 1, 2, \cdots, n$) in the unit disk U. We find functions $\varphi_k(z)$ analytic in D_k, $\varphi(z)$ in $D = U \setminus \cup_{k=1}^{n} (D_k \cup \partial D_k)$ and $\varphi_0(z)$ in $|z| > 1$, respectively, and find a complex constant $\lambda \neq 0$ such that the following $\mathbb{R}$-linear conditions are fulfilled

$$\varphi(t) = \varphi_k(t) - \rho_k \overline{\varphi_k(t)}, \quad t \in \partial D_k, \quad k = 1, 2, \ldots, n, \tag{1}$$

$$\varphi(t) = \overline{\lambda} \varphi_0(t) - \overline{\varphi_0(t)}, \quad |t| = 1, \quad \varphi_0(\infty) = 0. \tag{2}$$

Here, the constants $|\rho_k| < 1$ are given. A nodal domains conjecture on the eigenfunction $\varphi_0(z)$ is posed. Demonstration of the conjecture allows to justify that a set of inclusions can be made invisible by surrounding it with an appropriate coating.

Based on joint work with Natalia Rylko.

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