Spectral stability estimates for elliptic operators in domain perturbation problems

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Abstract

We consider the problem of finding estimates for the variation of the eigenvalues of partial differential operators of elliptic type following a domain perturbation. We survey several results and we present some estimates of the type

$$|\lambda_n[\Omega_1] - \lambda_n[\Omega_2]| \leq c_n \delta(\Omega_1, \Omega_2), \qquad n \in \mathbb{N},$$

for some constant c_n depending on n, where $\lambda_n[\Omega_1]$, $\lambda_n[\Omega_2]$ denote the eigenvalues of operators defined on the open subsets Ω_1, Ω_2 of $\mathbb{R}^N$ respectively, and $\delta(\Omega_1, \Omega_2)$ is a convenient 'measure of vicinity' of Ω_1, Ω_2 (e.g., Hausdorff distance, Lebesgue measure of $\Omega_1 \triangle \Omega_2$, etc.). Joint work with Victor I. Burenkov.