Kirill Cherednichenko (Cardiff)

Resolvent estimates for high-contrast elliptic problems with periodic coefficients

Abstract

I will discuss the asymptotic behaviour of the resolvents $(\mathcal{A}^\varepsilon + I)^{-1}$ of elliptic second-order differential operators $\mathcal{A}^\varepsilon$ in $\mathbb{R}^d$ with periodic rapidly oscillating coefficients, as the period of oscillations ε goes to zero. The class of operators covered by our results includes both the "classical" case of uniformly elliptic families (where the ellipticity constant does not depend on ε) and the "double-porosity" case of coefficients that take contrasting values of order one and of order ε^2 in different parts of the period cell. The error estimates we prove imply, in particular, order $O(\varepsilon^\gamma)$-closeness ($\gamma > 0$) of the spectra of the original operators and the spectra of the "approximating" operators. A way of calculating the latter is provided by the asymptotic procedure we propose. This is joint work with S. Cooper.