Homogenisation of High-Contrast Integral Operators

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Abstract

We deal with homogenisation problems for high-contrast symmetric convolution type operators with integrable kernels in media with a periodic microstructure. We adapt the two-scale convergence method to nonlocal convolution-type operators and obtain the homogenisation result both for problems stated in the whole space and in bounded domains with the homogeneous Dirichlet boundary condition. Then our focus is on homogenisation of the corresponding spectral problems. We describe the spectrum of the effective operator and characterize the limit behaviour of the spectrum of the original problem as the microstructure period tends to zero. It is shown that the spectrum of the limit operator belongs to the Hausdorf limit of the spectrum of the original operator, and that they need not coincide. This is a joint work with M. Cherdamtsev (University of Cardiff) and A. Piatnitski (UIT Narvick).

References

[1] Mikhail Cherdantsev, Andrey Piatnitski, Igor Velčić, Homogenisation and spectral convergence of high-contrast convolution type operators, accepted for publication in Journal of Differential Equations.