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An operator-asymptotic approach to periodic homogenization for equations of linearized elasticity

We present an operator-asymptotic approach to the problem of homogenization of periodic composite media in the setting of three-dimensional linearized elasticity. This is achieved by developing an asymptotic power series in $|\chi|$, where χ is the quasi-momentum/quasi-wavevector in the Bloch-wave expansion of the solution to the resolvent equation. The error between the exact solution and the truncated series is understood in the sense of operator norms, and we obtain as a consequence, L^2 to L^2, L^2 to H^1, and higher-order L^2 to L^2 norm-resolvent estimates.

Time permitting, we will also discuss the correctors in homogenization. The L^2 to H^1 and higher-order L^2 to L^2 correctors emerge naturally from the asymptotic procedure, and the former is shown to coincide with the classical formulae.

This is joint work with Josip Žubrinić (University of Zagreb). The preprint is available at `https://arxiv.org/abs/2308.00594`