

The dispersion tensor and its unique minimizer

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A first set of macro coefficients known as the homogenized coefficients appear in the homogenization of PDE on periodic structures. If energy is increased or scale is decreased, these coefficients do not provide adequate approximation. Using Bloch decomposition, it is first realized that the above coefficients correspond to the lowest energy and the largest scale. This naturally paves the way to introduce other sets of macro coefficients corresponding to higher energies and lower scales which yield better approximation.

In this talk, we introduce this macroscopic quantity, namely the dispersion tensor or the Burnett coefficients in the class of periodic media, as well as in the generalized Hashin–Shtrikman microstructures and we study the dependence of the fourth-order tensor in terms of the microstructure. We first review the results in periodic media, where we deal with the one-dimensional case and also some structures in higher dimension. Then, in the case of two-phase materials associated with the periodic Hashin–Shtrikman structures, we settle the issue that the dispersion tensor has a unique minimizer, which is the so called Apollonian–Hashin–Shtrikman microstructure.

References

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