

Effective Properties of Phononic Crystals in Bragg Regime

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We present how the full account of temporal dispersion and spacial dispersion leads to the precise description of effective-medium parameters of a phononic crystal made of periodic arrangement of rigid inclusions embedded in a viscothermal fluid in high-frequency regime where Bragg scattering phenomena appear. We discuss the interplay between micro-geometry, frequency, fluid motions, and dissipative processes, and its impact on the emergence of macroscopic temporal and spacial dispersion effects. In this respect, we compare the local approach based on a two-scale asymptotic homogenization method, and a general nonlocal homogenization scheme.