

Description of waves in discrete and in heterogeneous media with dispersive effective equations

Ben Schweizer

(ben.schweizer@tu-dortmund.de)

(T. U. Dortmund, Germany)

Dispersion occurs in media in which waves with different wave-length travel with different speed. A linear wave equation with constant coefficients does not show dispersion. A linear wave equation with periodic coefficients and a small periodicity can be replaced, in the homogenization limit, by a linear wave equation with constant coefficients, we hence do not expect dispersive effects. On the other hand, numerical experiments show that solutions have a dispersive behavior, at least after long time. We discuss this effect and derive dispersive effective equations. We furthermore investigate the wave equation in a discrete spring-mass model. The discrete character of the model introduces small-scale oscillations, which result in a dispersive long time behavior. We derive the dispersive effective wave equations for the discrete model.

We present joint work, obtained with A. Lamacz, T. Dohnal, and F. Theil.