

The halfspace matching method or how to solve scattering problem in infinite complex media

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We are interested in acoustic or elastic wave propagation in time harmonic regime in a two-dimensional medium which is a local perturbation of an infinite anisotropic homogeneous and/or periodic medium. We investigate the question of finding artificial boundary conditions to reduce the numerical computations to a neighborhood of this perturbation. This question is difficult due to the anisotropy and/or the periodicity of the surrounding medium and all classical approaches fail when considering elastic waves or periodic media. Our method consists in coupling several semi-analytical representations of the solution in halfspaces surrounding the defect with a FE computation of the solution around the defect. As representations of the same function, they have to match in the infinite intersections of the halfspaces. It leads to a formulation which couples, via integral operators, the solution in a bounded domain including the defect and its traces on the edge of the halfspaces.