Maryna Kachanovska -- ENSTA Poems

Stable perfectly matched layers for anisotropic dispersive models

The method of perfectly matched layers (PMLs) is widely used in physics and engineering to bound the computational domain for the wave propagation problems posed in unbounded domains. While this technique is highly efficient for isotropic, nondispersive problems, it often exhibits instabilities when applied to problems with anisotropy or dispersion, due to the presence of backward propagating waves. This talk consists of two parts. In the first part we show how to construct stable PMLs for a class of 2D anisotropic dispersive Maxwell's equations, with an application to the wave propagation in metamaterials and plasmas. In the second part we demonstrate how to construct stable PMLs for the 3D cold plasma in a strong background magnetic field, based on the treatment of the corresponding 2D model and a special splitting of the Maxwell system.

This is a joint work with Eliane Becache and Patrick Joly.