

Asymptotic-Preserving schemes for an efficient resolution of anisotropic elliptic and parabolic equations

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The aim of this talk will be the presentation of some Asymptotic-Preserving schemes for an efficient numerical resolution of highly anisotropic elliptic or parabolic equations, arising in several fields of application, as for example magnetically confined plasma. In such tokamak plasmas, the high anisotropy comes from the fact that the strong magnetic field B confines the charged particles in the direction perpendicular to the field lines, and permits them to evolve freely in the parallel direction. This property leads to rather different dynamics (in magnitude) in the perpendicular and parallel directions, yielding highly anisotropic (singularly perturbed) equations, which are difficult to solve numerically. The equations considered in this talk model the electrostatic potential or the temperature in a plasma. Closed magnetic field lines (for ex. magnetic islands) will be adequately treated in the presented AP-schemes.