AUTOMATIC HIGH ORDER ABSORPTION LAYERS FOR ADVECTIVE-DIFFUSIVE SYSTEMS OF EQUATIONS

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Abstract. Reflection of waves at artificial boundaries degrade the quality of numerical solutions and can prevent convergence to the infinite domain solution. Absorbing boundary conditions (ABC's) eliminate this reflections ensuring convergence to the infinite domain solution. High order ABC's reduce further the computational cost by allowing shorter domains for the same level of precision. The PML technique (Perfectly Matched Layer) has been applied in order to obtain very efficient high order ABC's, but however, they tend to be unstable. In addition, the development of the PML absorbing term is specific to each physical problem. In this paper we propose a technique that develops an ABC for any advective-diffusive problem to any order and has the practical advantage that can be implemented only in terms of the computation of the advective fluxes. The technique is based on the standard expansion of the absorbing term in terms of lateral wave number and computing the matrix coefficients for the higher order terms by polynomial fitting. Several numerical examples are presented.