

A MODIFIED STRANG SPLITTING METHOD FOR LINEAR DISPERSIVE PROBLEMS WITH TRANSPARENT BOUNDARY CONDITIONS

M. RESIDORI*, A. OSTERMANN, L. EINKEMMER

ABSTRACT

The present work proposes a second-order time splitting scheme for a linear dispersive equation with a variable advection coefficient subject to transparent boundary conditions. For its spatial discretization, a dual Petrov–Galerkin method is considered which gives spectral accuracy. The main difficulty in constructing a second-order splitting scheme in combination with pseudo-spectral methods lies in the compatibility condition at the boundaries of the sub-problems. In particular, the presence of an inflow boundary condition in the advection part results in order reduction. To overcome this issue a modified Strang splitting scheme is introduced that retains second-order accuracy. Stability is proven for the proposed semi-discrete numerical scheme (discrete in time and continuous in space). Numerical results are shown to support the theoretical derivations [1].

REFERENCES

- [1] L. Einkemmer, A. Ostermann, M. Residori. *A pseudo-spectral Strang splitting method for linear dispersive problems with transparent boundary conditions*, Numer. Math. 150 (2022), 105–135.

* TU DRESDEN, MIRKO.RESIDORI@TU-DRESDEN.DE