

# LEAST-SQUARES SPACE-TIME FORMULATION FOR ADVECTION-DIFFUSION PROBLEM WITH EFFICIENT LINEAR SOLVER BASED ON MATRIX COMPRESSION

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## ABSTRACT

We present a space-time formulation of the non-stationary advection-dominated advection-diffusion problem based on a constrained least-squares approach. For discretization we use Isogeometric Analysis and employ B-spline basis functions. While using standard separate time and space discretization, in some restricted cases it is possible to construct highly efficient linear solvers exploiting the structure of the problem and the time stepping schemes (e.g. [1]), with space-time formulation the resulting matrix has a more complex structure. We present the idea of an iterative solver employing a matrix compression technique based on recursive decomposition and singular value decomposition (SVD).

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## REFERENCES

- [1] Behnoudfar, P., Calo, V.M., Łoś, M., Maczuga, P., Paszyński, M., *Variational splitting of high-order linear multistep methods for heat transfer and advection-diffusion parabolic problems*, Journal of Computational Science 63 (2022), pp. 1-11.

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