

POD-based ROM modified to predict solutions in time

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SUMMARY

Reduced-order models (ROMs) based on the proper orthogonal decomposition (POD) are widely used to reduce computational costs when compared to standard numerical methods, also called full-order models (FOMs). The ROM strategy consists of two parts: the off-line part, in which the ROM is trained by applying the snapshot method (cf. [1]) to the solutions of the FOM computed up to the training time; and the on-line part, in which the ROM is solved up to the same training time. One of the most important limitations of POD-based ROMs is the prediction of solutions beyond the training time when considering hyperbolic problems. In this work, a modified ROM based on a coordinate transformation (CT-ROM, cf. [1, 3]) is presented which allows to compute the solution of advection-dominated problems beyond the training time. The CT-ROM is tested by applying it to problems of different nature, including linear and non-linear equations and systems of equations. In addition, this strategy is also applied to 2D problems by means of the Radon transform.

Keywords: Reduced-order modelling, POD methods, snapshots method, computational resources, time extrapolation

AMS Classification: 65M08, 35Q35

References

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