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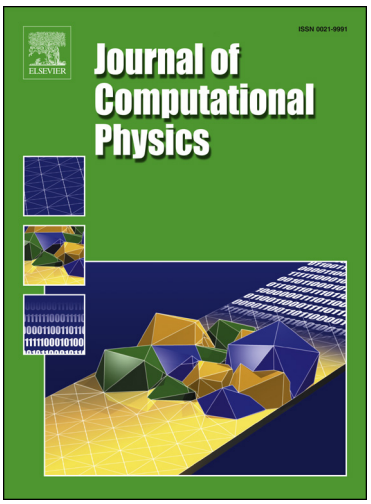

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Hierarchical Multi-dimensional Limiting Strategy for Correction Procedure via Reconstruction

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Abstract

Hierarchical multi-dimensional limiting process (MLP) is improved and extended for flux reconstruction or correction procedure via reconstruction (FR/CPR) on unstructured grids. MLP was originally developed in finite volume method (FVM) and it provides an accurate, robust and efficient oscillation-control mechanism in multiple dimensions for linear reconstruction. This limiting philosophy can be hierarchically extended into higher-order *Pn* approximation or reconstruction. The resulting algorithm is referred to as the hierarchical MLP and facilitates detailed capture of flow structures while maintaining formal order-of-accuracy in a smooth region and providing accurate non-oscillatory solutions across a discontinuous region. This algorithm was developed within modal DG framework, but it can also be formulated into a nodal framework, most notably the FR/CPR framework. Troubled-cells are detected by applying the MLP concept, and the final accuracy is determined by a projection procedure and the hierarchical MLP

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