

High order PVM-based schemes for solving shallow flows using GPUs

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Abstract

In this work, we present high order path-conservative PVM-based schemes for solving shallow flows using Graphics Processing Units (GPUs). Let us recall that path-conservative PVM schemes have been introduced in [2] and they have been applied to balance laws and non-conservative hyperbolic systems. They are defined in terms of viscosity matrices computed by a suitable polynomial evaluation of a Roe matrix. These methods have the advantage that they only need some information about the eigenvalues of the system to be defined, and no spectral decomposition of Roe Matrix is needed. High order PVM-based schemes for non-conservative systems are obtained following the procedure described in [1]. Here, two different reconstruction operators are considered: the one introduced by the authors in [4] for quadrilateral grids and the WENO type reconstruction operator introduced in [3] for unstructured triangular grids. In both cases, a substantial improvement of the speedup with respect to normal CPUs is achieved. Finally some numerical tests showing the performance of the proposed schemes will be shown.

References

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