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A fully-discrete entropy conserving/stable discretization for inviscid unsteady flows

A. Colombo[1], A. Crivellini[2] and A. Nigro[2]

[1] Università degli Studi di Bergamo, Department of Engineering and Applied Sciences
alessandro.colombo@unibg.it

[2] Marche Polytechnic University, Department of Industrial Engineering and Mathematical Science
a.crivellini@univpm.it, a.nigro@univpm.it

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The aim of this work is to present a fully-discrete entropy conserving/stable scheme to simulate inviscid unsteady flows. The discretization in space of the Euler equations is performed with a high-order Discontinuous Galerkin (DG) method, while the time advancement is performed with an implicit second order accurate entropy conserving Crank-Nicolson scheme. To ensure the entropy conserving/stable property in space, the DG discretization is written in terms of entropy working variables and several entropy conserving/stable numerical fluxes are employed [1, 2, 3]. To advance the solution in time ensuring a null entropy variation, the Crank-Nicolson scheme, originally developed for a Finite Volume scheme with conservative working variables [4, 5], is extended to DG method with entropy variables. Several temporal and spatial refinement studies have been performed on different test-cases to assess the accuracy and the conservation properties of both the temporal and the spatial discretizations.

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