6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11 – 15 June 2018, Glasgow, UK

An *a posteriori* very efficient hybrid method for compressible flows

Javier Fernández-Fidalgo[1]*, Xesús Nogueira[1], Luis Ramírez[1] and Ignasi Colominas[1]

[1] Universidade da Coruña, Group of Numerical Methods in Engineering, Campus de Elviña, 15071, A Coruña, Spain.
e-mail: {javier.fernandez1, xesus.nogueira, luis.ramirez, icolominas}@udc.es
web page: http://caminos.udc.es/gmni/

Key Words: *High order schemes, compressible flows, Finite Differences*

Finite Difference methods (FDM) are computationally very efficient. Nevertheless, centered formulations are not able to solve cases where shock waves appear without the explicit addition of artificial viscosity to dump the oscillations that appear. Many FDM based on Weighted Essentially Non-Oscillatory (WENO) formulations exist in the literature [1,2] that can deal with shock waves, but are computationally more expensive than centered schemes, especially in higher dimensions.

In this work, we present a hybrid method that employs 4^{th} order Dispersion Relation Preserving Finite Differences [3] to solve those the smooth regions of the flow, and 5^{th} order WENO [1] or CRWENO [2] scheme to solve regions close to shock waves.

A multi-block approach using Moving Least Squares (MLS) [4] for communication between meshes has been also implemented.

It is shown with several examples that the hybrid method can obtain very precise results with notable savings in computational time.

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