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A relationship between the Shock-Capturing and Vorticity Confinement methods

Shock-Capturing methods are a general class of techniques for computing compressible flows with shock waves. Vorticity Confinement methods aim at enhancing the resolution of vortical structures by numerical methods. Despite the fact that these two approaches were developed for entirely different purposes, there appears to be a deep commonality between the two.

In this presentation we shall explore this commonality and present novel multidimensional extensions of the TVD and finite difference ENO/WENO methods for the compressible flow equations, which can be viewed as a unification of the Shock-Capturing and Vorticity Confinement methodologies. This is because it acquires capabilities of the both by means of a single mechanism. The performance of the new methods will be illustrated by numerical experiments.