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High-Order Non-Oscillatory Compact Reconstruction Scheme for Overset Grids

The numerical solution of turbulent, compressible flows requires the accurate modeling of a large range of length scales. In addition, domains for practical flow problems are often discretized with a system of overset, body-fitted meshes. In the present study, a high-order, non-oscillatory compact scheme is presented for domains involving overset mesh systems. Compact schemes have higher spectral resolution and lower errors than non-compact schemes of the same order, resulting in improved capturing and preservation of flow features. The WENO adaptive stenciling procedure is used to avoid oscillations across discontinuities. The algorithm is demonstrated for problems involving overset meshes that comprise a hole, overlap and field region. Although a compact scheme results in a coupling of the interpolated values between the three regions, the adaptive stenciling in our scheme decouples the hole region where flow values are not physical. Results are presented for steady and unsteady flows over airfoils.