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Large eddy simulation using a multidomain spectral method[1]
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— Spectral/hp element methods are now well established for direct simulation of turbulent flows in moderately complex configurations. However there have been limited attempts to extend them to the field of large-eddy simulation (LES). In this work we report the development of a LES procedure for compressible turbulent flows using a Chebyshev multidomain spectral method. The method uses a fully staggered grid on hexahedral sub-domains. Staggering of solution and fluxes leads to a fully conservative algorithm and imposes no smoothness requirement on grids across the sub-domain interfaces, thereby allowing use of unstructured hexahedrons. Geometric flexibility through unstructured domain decomposition and higher-order approximation within each sub-domain makes the method ideal for application to complex flow simulation in practical geometries. For LES, an extension of the dynamic model of Germano applicable to compressible flows is employed. The test filtering associated with the model, is accomplished through a sub-domain based Lagrange-interpolant projection technique. Results from decaying isotropic turbulence and channel flow simulations are presented.

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