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A dynamic sub-grid model for variational multiscale methods SCOTT MURMAN, LASLO DIOSADY, ANIRBAN GARAI, NASA Ames Research Center — The variational multiscale method uses an explicit *a priori* separation of scales, along with Galerkin projection as the filter operator, to develop an alternative to the classical LES approach.[1] A dynamic, parameter-free, multiscale extension of this approach is developed from the variational implementation of Germano's identity.[2] The method is implemented in an entropy-stable Discontinuous-Galerkin spectral-element solver.[3] We outline the relevant details of the method using *a priori* testing, before demonstrating the performance in *a posteriori* testing on several canonical flows, including homogeneous isotropic turbulence, channel flow, and separated flow over an array of periodic hills. These computed results are compared against DNS, classical LES, and experimental data.

[1]Hughes *et al.* Comput. Visual Sci. Sci. **3**, 47 (2000)
[2]Oberai and Wanderer, J. of Turbulence **6**, 7 (2005)
[3]Diosady and Murman, AIAA 2014-2784

Scott Murman
NASA Ames Research Center

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