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Inhomogeneous differential filters for explicit LES MASSIMO GERMANO, Duke University — Variable width filters in space and time are essential for the large eddy simulation of complex turbulent flows, when inhomogeneous unstructured grids are applied. Unfortunately inhomogeneous filters produce the so called commutation error difficult to calculate and to model. Here we will examine the commutation error associated to inhomogeneous differential filters both as regards the space and the time derivatives. This class of explicit filters is particularly appealing for explicit LES and is used in many explicit filtering procedures: they have been applied as test filters in the dynamic approach and as a method to rigorously derive the constitutive equations for the large scale field and to separate the filtering and the discretized operators. The commutation errors are in this case explicitly derived, and the particular case of the inhomogeneous parabolic differential filter is examined in detail.

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