

Abstract Submitted
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Commutative Recursive Filters for Explicit-Filter Large-Eddy Simulation of Turbulent Flows¹ MYEONGKYUN KIM, DAEGEUN YOON, DONGHYUN YOU, Pohang University of Science and Technology — One of the most notable drawbacks associated with the implicit-filter LES is that the simulation result is dependent on the numerical grid employed due to the inherent dependence of the filtering operation on the numerical discretization. Alternatively, commutative explicit filters can be applied to distinguish the filtering operation from the underlying mesh distribution, thereby eliminating grid sensitivities. The efficacy of explicit-filtering to obtain grid-independent solutions of turbulent flows has been successfully demonstrated in the previous research (Bose, Moin & You, *Phys. Fluids*, 2010; Singh, You & Bose, *Phys. Fluids*, 2012). However, the use of broad-width filters accompanies significant increase in computational cost in terms of memory space and communication load for a distributed memory (MPI-based) parallel computation. To overcome the difficulty, a recursive filtering algorithm which can effectively replace a broad-width commutative filter with a series of narrow-width filters. The efficacy of the commutative recursive filtering method is evaluated in explicit-filter LES of turbulent channel flow, with particular attention to the performance of commutative recursive filters in terms of computational cost and memory requirement for a parallel computation.

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