

Abstract Submitted  
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**Truncated Navier-Stokes Equations with the Automatic Filtering**

TAWAN TANTIKUL, JULIAN DOMARADZKI — Truncated Navier-Stokes (TNS) methodology is a LES technique which does not use explicit SGS models but utilizes the periodic filtering of a solution to provide the necessary dissipation. It has been successfully validated for many turbulent flow problems. One drawback of TNS is that the filtering time interval which dictates the activation of the filtering operation in the simulation has to be prescribed in advance and is obtained by trial and error. The modified TNS procedure where the filtering interval is determined automatically during the simulations is presented. The decision for the automatic activation of the carefully designed filter is made by using the comparison between theoretically derived criterion and the same numerically calculated quantity. The criterion is designed to prevent the fields from being contaminated by the accumulated energy in the small resolved scales caused by the lack of subgrid scales. The procedure is tested in a sequence of TNS simulations for turbulent channel flow and Reynolds numbers based on the friction velocity and channel-half width up to 2000 for which detailed DNS data are available for comparison. The simulations demonstrate a convergence toward their respective DNS results once the near wall structures are resolved. The results at high grid resolution exhibit the independence of the quality of the results on the filtering criterion at a certain constant filtering interval.

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