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Application of the Integral Length-Scale Approximation to Wall Modelled LES AMIRREZA ROUHI, UGO PIOMELLI, Queen's University, Canada, ALEXANDRE SILVA-LOPES, University of Porto, Portugal — A new length-scale for modelling the unresolved stresses in LES was proposed [Piomelli *et al.*, *J. Fluid Mech.*, **766**, 2015] in which the filter width is related to the turbulence statistics instead of the grid. The model constant is assigned by requiring that the unresolved, subfilter scales (SFS) support some percentage of the total stress. This model gave very good results in wall-resolved LES channel flow. When the same model is applied to wall-modelled simulations, however, significant errors result due to the requirement that the contribution of SFS to the transport be constant through the channel. Near the wall, the grid becomes larger than the mixing length of the flow, and the resolved eddies are not able to support the desired contribution to the transport. Better agreement is obtained by requiring that, as the wall is approached, the SFS contribute an increasing percentage of the momentum transport, reaching 100% at the wall. The model was tested on channel flows at $Re_\tau = 5 \times 10^4$ and 5×10^5, using $256 \times 80 \times 128$ and $256 \times 160 \times 128$ grid points. The simulations predict the universal log-law very well. The model has the same cost as the Smagorinsky model and the robustness of the dynamic eddy-viscosity model.

Amirreza Rouhi
Queen's University, Canada

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