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On the Scale Similarity in Large Eddy Simulation

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Scale similarity models in LES were created to overcome the drawbacks of eddy viscosity-type models. This similarity allows to effectively relate the unresolved scales, represented by the Modified Cross tensor and the Modified Reynolds tensor, to smallest resolved scales represented by the modified Leonard tensor (Bardina et al.) or by a term obtained through multiple filtering operations at different scales (Liu et al.). The models of Bardina et al. and Liu et al. are affected, however, by a fundamental drawback: they are not dissipative enough, i.e they are not able to assure a sufficient energy drain from resolved scales of the motion to unresolved ones. The goal of this paper is to investigate on the reason of such drawback. A scale similarity LES model that is able to grant an adequate drain of energy from resolved scales to unresolved ones.

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