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Scale-Resolving simulations (SRS): How much resolution do we really need? FILIPE M.S. PEREIRA, Instituto Superior Tcnico - Universidade de Lisboa, SHARATH GIRIMAJI, Texas AM Univ — Scale-resolving simulations (SRS) are emerging as the computational approach of choice for many engineering flows with coherent structures. The SRS methods seek to resolve only the most important features of the coherent structures and model the remainder of the flow field with canonical closures. With reference to a typical Large-Eddy Simulation (LES), practical SRS methods aim to resolve a considerably narrower range of scales (reduced physical resolution) to achieve an adequate degree of accuracy at reasonable computational effort. While the objective of SRS is well-founded, the criteria for establishing the optimal degree of resolution required to achieve an acceptable level of accuracy are not clear. This study considers the canonical case of the flow around a circular cylinder to address the issue of ‘optimal resolution. Two important criteria are developed. The first condition addresses the issue of adequate resolution of the flow field. The second guideline provides an assessment of whether the modeled field is canonical (stochastic) turbulence amenable to closure-based computations.

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