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RANS simulations of a flow over a rotating disk: grid sensitivity analysis SVETLANA V. POROSEVA, MICHAEL A. SNIDER, University of New Mexico — In industry, a need in accurate and reliable flow simulations often comes with the requirements for reduced computational time and cost. To find an optimal balance between these requirements, a sensitivity analysis of simulation results with respect to various simulations parameters should be conducted at the early stage of computations. When experimental data is not available for validating simulations in a given flow geometry, such study can be conducted for a relevant benchmark problem instead. In the current study, a sensitivity analysis was conducted for flow simulations over a rotating disk. This case can serve as a benchmark problem for flow simulations around a wind turbine, for example. Indeed, as a number of blades on a wind turbine approaches infinity, the turbine's geometry transforms to a solid disk. The convergence of simulation results with respect to the size of computational domain, boundary proximity, grid stretching, and initial grid wall spacing was analyzed for five standard turbulence models available in Star-CCM+ software. Objectives were i) to find the coarsest grid that closely reproduces results obtained with a given turbulence model on more fine grids and ii) to find a model that is more robust to changes in the gird parameters.

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