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Comparative Study of Reynolds Averaged and Embedded Large Eddy Simulations of a High Pressure Turbine Stage[1] ALEKSANDAR JEMCOV, THEODORE WILLIAMS, THOMAS CORKE, University of Notre Dame — An Embedded Large Eddy Simulation (ELES) approach is used to simulate the flow path through a high pressure turbine stage. The turbine stage includes the entry duct, stationary inlet and exit guide vanes, and a rotor. The rotor blade design includes a squealer tip. The flowfield around the rotor is simulated using LES. A Reynolds Averaged Simulation (RAS) is used to simulate the rest of the flow domain. The interface between RAS and LES domains uses the RAS turbulence quantities as a means of obtaining length scales that are used in computing the vorticity that is required to trigger a proper energy cascade within the LES part of the flow field. The ELES approach allows for substantial computational savings since it allows for different mesh resolutions in various parts of the computational domain as needed. The objective of this work is to observe at a lower computational cost, the local flow features that cannot be resolved in a RAS approach. A comparative analysis between RAS and ELES approaches for this turbomachinery problem is then presented.

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