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**Quick Overview**

Please mark with an “X” in the red, yellow or green boxes how do you assess the present (general) status of your work:

(red = critical status, yellow = moderately problematic status, green = everything is running well)

**Timely according to DoW**

**Costs**

**Technical Progress**

**X**

**X**

**X**

**Please note:**

**When you have ticked yellow or red boxes, please explain problems you have encountered and possible solutions below:**

* …
* …
* …

**Please double-click on the table to open Excel file**  
**\*) Task Status: N = Not yet started, O = Ongoing, C = Completed**



**Summary of Activities**

Please describe concisely, for the actual quarter and task by task, e.g.:

*Work started, work performed, achievements, problems, dissemination activities, technical meetings managed and/or participated in, purchases, subcontracts, and what else is important for monitoring the project*

Task 1.1:

Task 1.2: The test case definition for the 3-element airfoil (TC.I3) was updated, and the required files and information for computing the case were uploaded to the website (reference documents, mesh files, experimental data).

Task 2.1: not involved

Task 2.2: not involved

Task 3.1: The preparatory work for TC.F1, i.e. validating the DLR-TAU code in (rather inexpensive) WM-LES simulations of wall-bounded flows, was finalized by computing the plane channel flow with SST- and RSM-based IDDES (in WM-LES mode) and the new LD2-scheme at an even higher Reynolds number of Reτ = 4200. Despite slightly worse agreement with DNS data than for the lower Reynolds numbers, both the improved numerical scheme and the (partly new) modelling approaches are considered adequate for the assessment of the flat-plate flow (TC.F1).  
For that case, the mandatory grid was converted to TAU’s unstructured grid format, and an initial simulation setup using the mandatory inflow conditions was derived. The numerical setup was consolidated in basic steady SA-RANS simulations, which also serve as initial and reference solutions for the later assessment of synthetic turbulence methods. Additional preliminary computations applying the “Synthetic-Eddy Method” (SEM) on coarse grids were conducted to determine suited parameters for the Dirichlet-type inlet boundary condition, which is used to introduce the artificial fluctuations into the flow field. Depending on these parameters, rather strong pressure disturbances were observed at the inlet, which are due to the (unphysical) divergence of the synthetic turbulence field. Although a parameter setup with somewhat reduced pressure waves could be determined, it is still open at this point, if this reduction is sufficient to avoid any harmful side effects on the turbulence development length. Possible remedies are the switch to the “Divergence-free Synthetic-Eddy Method” (DF-SEM), or the usage of damping (sponge) layers near the inlet for the pressure fluctuations.

Currently, first full simulations on the mandatory grid with original (i.e. unmodified) SEM and SA-IDDES are running, which, however, require some more time for statistical averaging. Moreover, in order to prepare according simulations with RSM-based IDDES, the required statistical inflow data at ReΘ≈3000 were derived from a steady RSM-RANS simulation of the flat plate. These data provide a more realistic anisotropic Reynolds-stress field than the mandatory data (derived from SA-RANS), which is expected to yield a reduced RANS/LES transition length when combined with the SEM approach.

Task 3.2: For the 2D hump flow (TC.I4), reference TAU simulations using SST-IDDES were started based on the mandatory setup. Besides original IDDES, a recent combination with the vorticity-based LES filter scale Δω is applied, which is expected to yield a (limited) reduction of the grey area downstream of separation. These simulations will be used in comparisons with later embedded LES simulations.

Task 4.1: not involved

Task 4.2: not yet started