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Numerical computations of turbulent flows; LES/SAS comparison MARCEL ILIE, University of Central Florida, STEFAN LLEWELLYN SMITH, University of California, San Diego — In aerodynamics, the unsteady fluctuations of the flow field can have a significant influence on stalled flow characteristics, or on the forces acting on different parts of the aircraft. In non-aerodynamic flows, there is a multitude of mixing problems such as piston engines or turbine blade cooling where steady Reynolds-Averaged Navier-Stokes (RANS) solutions are not adequate. On the other hand the unsteady Reynolds-Averaged Navier-Stokes (URANS) has proven to be insufficient. This is due to the highly dissipative nature of standard URANS. The use of Large Eddy Simulation (LES) methods is often not practical, due to the requirement of very fine grid resolution near walls. Direct Numerical Simulations (DNS) compute the flow field without further simplifications. However, due to a wide range of length and time scales present in turbulent flows, the use of DNS is still limited to low-Reynolds-number flows and relatively simple geometries. To combine the advantages of a URANS with the higher resolution of a LES, hybrid methods such as Detached Eddy Simulation (DES) or Scale Adaptive Simulation (SAS) are preferred. The present research concerns the suitability of SAS for the computation of highly separated flows. The results show that SAS is a promising approach for the computation of massively separated flows.

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