Abstract Submitted
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Large Eddy Simulation of Transitional Boundary Layer[1]
TARANEH SAYADI, PARVIZ MOIN, CTR, Stanford University — A sixth order compact finite difference code is employed to investigate compressible Large Eddy Simulation (LES) of subharmonic transition of a spatially developing zero pressure gradient boundary layer, at $Ma = 0.2$. The computational domain extends from $Re_x = 10^5$, where laminar blowing and suction excites the most unstable fundamental and sub-harmonic modes, to fully turbulent stage at $Re_x = 10.1 \times 10^5$. Numerical sponges are used in the neighborhood of external boundaries to provide non-reflective conditions. Our interest lies in the performance of the dynamic subgrid scale (SGS) model [1] in the transition process. It is observed that in early stages of transition the eddy viscosity is much smaller than the physical viscosity. As a result the amplitudes of selected harmonics are in very good agreement with the experimental data [2]. The model's contribution gradually increases during the last stages of transition process and the dynamic eddy viscosity becomes fully active and dominant in the turbulent region. Consistent with this trend the skin friction coefficient versus Re_x diverges from its laminar profile and converges to the turbulent profile after an overshoot. 1. Moin P. *et. al.* Phys Fluids A, **3**(11), 2746-2757, 1991. 2. Kachanov Yu. S. *et. al.* JFM, **138**, 209-247, 1983.

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Taraneh Sayadi
CTR, Stanford University

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