Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Comparison two different LES closure models of the transitional boundary layer flow DIMITRY IVANOV, ANDREI CHORNY, A.V. Luikov Heat and Mass Transfer Institute, Minsk, Belarus — The goal of the present research is to measure the velocity profile in the thin boundary layer of a flat plate at zero angle of attack. We consider a flow over a flat plate with a uniform velocity profile. The uniform velocity fluid hits the leading edge of the flat plate, and a laminar boundary layer begins to develop. The near-wall, subgrid-scale (SGS) model is used to perform Large Eddy Simulation (LES) of the incompressible developing, smooth–wall, flat–plate turbulent boundary layer. In this model, the stretched–vortex, SGS closure is utilized in conjunction with a tailored, near–wall model designed to incorporate anisotropic vorticity scales in the presence of the wall. The composite SGS-wall model is presently incorporated into a computer code suitable for the LES of developing flat-plate boundary layers. Presently this model is extended to the LES of the zero–pressure gradient, flat-plate turbulent boundary layer. LES solver using Smagorinsky and the One-equation LES turbulence models. Results show that the normalized mean velocity profile is in good agreement with the universal law-of-the-wall and previous published data. In order to ensure the quality of the numerical results a convergence study was performed.

Dimitry Ivanov
A.V. Luikov Heat and Mass Transfer Institute, Minsk, Belarus

Date submitted: 18 Jul 2016 Electronic form version 1.4