

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

DNS of a non-equilibrium adverse pressure gradient turbulent boundary layer¹ TAYGUN R. GUNGOR, AYSE G. GUNGOR, Istanbul Technical University, YVAN MACIEL, Laval University, MARK P. SIMENS, Universidad Politecnica de Madrid — A new direct numerical simulation (DNS) dataset of a non-equilibrium adverse pressure gradient (APG) turbulent boundary layer (TBL) that evolves from a zero-pressure-gradient (ZPG) TBL to a TBL which is very close to separation at Re_θ is around 8200 is presented. There are two simulations running together in the DNS computational setup. The APG TBL spans $Re_\theta = 1476 - 8276$. Mean velocity results do not satisfy the log law as the defect in the velocity increases. The production and the Reynolds stress peak are observed around $y/\delta^* = 1$ after the flow is evolved up to a certain point. The new dataset is compared with other datasets in terms of mean values, Reynolds stresses and turbulent kinetic energy budgets and using this comparison scaling study is performed.

¹Funded by in part by ITU-AYP and NSERC of Canada

Ayse G. Gungor
Istanbul Technical University

Date submitted: 01 Aug 2017

Electronic form version 1.4