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**DNS of Turbulent Boundary Layer Subject Strong Adverse Pressure Gradient**[1] GUILLERMO ARAYA, Swansea University, LUCIANO CASTILLO, Rensselaer Polytechnic Institute — Direct Numerical Simulations of spatially evolving turbulent boundary layers with prescribed strong adverse pressure gradients are performed. The driven force behind this investigation is to analyze the interaction between the inner and outer layers in adverse pressure gradient with eventual separation. A method for prescribing realistic turbulent velocity inflow boundary conditions is employed. The approach is based on the rescaling-recycling method proposed by Lund et al. (1998) and the dynamic multi- scale method developed recently by Araya et al. (2009). The standard rescaling process requires prior knowledge about how the appropriate velocity and length scales are related between the inlet and recycle stations (e.g. classic scaling laws). Here a dynamic approach is proposed in which such information is deduced dynamically by involving an additional plane located between the inlet and recycle stations. The approach also distinguishes between the inner and outer regions of the boundary layer and enables the use of multiple velocity scales. This flexibility allows applications to boundary layer flows with arbitrary pressure gradients.

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