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Power Law for Rough Favorable Pressure Gradient Turbulent Boundary Layers KATHERINE NEWHALL, LUCIANO CASTILLO, Rensselaer Polytechnic Institute — Current studies on rough favorable pressure gradient (FPG) boundary layers are very challenging particularly since it is difficult to obtain values of skin friction as a function of roughness, pressure gradient strength and Re_θ . This study presents a new modified form of the power law from George and Castillo (1997) developed for smooth zero pressure gradient boundary layers. The new form accounts for mild pressure gradients, and aids in the account for rough surface boundary layers. Emphasis will be given to its application to rough FPG flows. The values of the skin friction for smooth FPG boundary layers are obtained within 3%. Moreover, the composite profile for the mean velocity accurately describes both FPG and APG flows. The modified power law solution has the advantage of being a continuous solution for smooth and rough profiles subject to external pressure gradients. In addition, by using the Navier Stokes equation the Reynolds shear stress is accurately calculated from the composite description of the mean velocity.

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