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POD Analysis of a ZPG Turbulent Boundary Layer with and without Surface Roughness JENSEN NEWMAN, PAT RUSSO, LUCIANN CASTILLO, Rensselaer Polytechnic Institute, GUILLERMO ARAYA, Swansea University, DON DREW, Rensselaer Polytechnic Institute — Effects of surface roughness on coherent structures of a zero pressure gradient turbulent boundary layer are investigated via the POD method. In this study we seek to gain better understanding of how the small scales of turbulence are able to influence the large scales; particularly in rough surface flows. Comparison with coherent structures in a smooth case by Baltzer et al (2010) will be shown to assess the role of surface roughness in a transitional rough regime. The POD analysis is performed using the method of snapshots on two turbulent boundary layer DNS databases created using the dynamic multi scale recycling plane method developed by Araya et al. (2011) at Reynolds numbers of 2000-2300. Snapshots are separated by a time of $150\theta_0/U_\infty$. Resulting POD modes are qualitatively compared to assess the effects of roughness on the coherent structures. Baltzer, R.J.; Adrian, J.; Wu, X., “Turbulent Boundary Layer Structure Identification via POD,” in *Stanford Center for Turbulence Research Summer Program*, 2010. G. Araya, *et al.*, “A dynamic multi-scale approach for turbulent inflow boundary conditions in spatially developing flows,” *Journal of Fluid Mechanics*, vol. 670, pp. 581-605, 2011.

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