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**Coherent turbulent motions in a Mach 3 boundary layer**[1] IZAAK BEEKMAN, YIN-CHIU KAN, STEPHAN PRIEBE, PINO MARTIN, University of Maryland — We examine coherent structures found in a Mach 3, compressible, turbulent boundary layer using a new, long domain ($x_L = 50\delta_{inlet}$), spatial direct numerical simulation (SDNS). Recent studies have shown that certain coherent motions, termed "superstructures," or very large scale motions (VLSM), play an important dynamical role, strongly impacting the near wall cycle.[2] While most previous studies have been performed on incompressible boundary layers and at higher Reynolds numbers, Ringuette, Wu & Martin have shown that these structures are present at the conditions of the current simulation.[3] With this simulation we examine the dynamics and geometry of the large scale turbulence structures using statistical techniques, as well as visualizations. Additionally, we characterize the footprint of these coherent structures and their interaction with the wall.

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[2]I. Marusic, R. Mathis & N. Hutchins. Predictive model for wall-bounded turbulent flow. *Science*, 329(5988):193-6, 2010.
[3]M. J. Ringuette, M. Wu & M. P. Martin. Coherent structures in direct numerical simulation of turbulent boundary layers at Mach 3. *J Fluid Mech.*, 594:59-69, 2008.

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