Abstract Submitted for the DFD07 Meeting of The American Physical Society

The large-scale structure of turbulent pipe and channel flows JA-SON MONTY, JAMES STEWART, ROB WILLIAMS, MIN CHONG, The University of Melbourne — In recent years there has been renewed interest in the large-scale behaviour of wall-turbulence. This is largely due to the insights of Adrian and coworkers (see Adrian, Phys. Fluids, 041301, 2007) and more recently Hutchins & Marusic (J. Fluid Mech., 579, 2007). Much of the existing work has centered around turbulent boundary layer measurements, leaving scope for further investigation into pipe and channel flows. Following the work of Hutchins & Marusic (HM07), the authors sought to study the large-scale structure of duct flows using multi-probe hot-wire arrays. The arrays were custom made to minimise blockage and consisted of up to 15 hot-wires. The results show that 'superstructures', identified by HM07 for boundary layers, exist qualitatively similarly in pipes and channels. These coherent structures have lengths of up to 20 pipe radii or channel half-heights. Furthermore, it was found that the spanwise width of the structures was similar in pipes and channels, but much larger than that in a boundary layer. This work forms part of an ongoing investigation into the structural similarities and differences between pipes, channels and boundary layers.

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Date submitted: 03 Aug 2007

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