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An investigation of the very large scale motions in turbulent pipe flow[1] LEO HELLSTRÖM, Princeton University, ALEXANDER SMITS, Princeton University, Monash University — The very large sale motions (VLSM) in fully developed pipe flow were characterized using three component, time-resolved Stereoscopic Particle Image Velocimetry (SPIV). The work was conducted at Reynolds number of $50,000$ and $100,000$. In accordance with previous work, the VLSM have a characteristic $10-20R$ in pipe flow, meandering structures, contain $40-60\%$ of the TKE and $30-50\%$ of the Reynolds shear stress. Classical and snapshot POD were performed on the 3C fluctuating velocity field. It is shown that Proper Orthogonal Decomposition (POD) can be used as a low energy filter to extract the VLSM. The POD eigenfunctions and the reconstructed velocity field is then used to investigate the behavior and three-dimensional structure of the VLSM.

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