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Time-resolved PIV in fully developed turbulent pipe flow[1] LEO HELLSTRÖM, ALEXANDER SMITS, Princeton University — Stereoscopic particle image velocimetry was used to study the three-component velocity field in fully developed turbulent pipe flow, to investigate the structure and behavior of the large and very large scale motions in the outer layer. The data was acquired with a high speed camera, making it possible to resolve the velocity field in time for Reynolds numbers ranging from 1.3×10^4 to 3.6×10^4. Proper Orthogonal Decomposition was performed on the data to extract the most energetic modes in the flow, which are believed to correspond to the very large scale motions. We show that a small number of modes may be used to reconstruct these structures. The procedure can be used as a VLSM filter to further investigate their behavior.

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