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POD analysis of turbulent pipe flow¹ ALEXANDER J. SMITS, Princeton University, Monash University, LEO HELLSTRÖM, Princeton University, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton — Proper Orthogonal Decomposition was introduced into the analysis of turbulent flow by Lumley (1967, 1981). Turbulent flows pose particular challenges for POD analysis because the energy is distributed over a wide range of scales. It has recently been found, however, that POD can be a powerful experimental tool for identifying the largest scales, especially the Large Scale Motions (LSMs) and Very Large Scale Motions (VLSMs) in turbulent pipe flow. It has also been useful, for example, to identify the large-scale motions that dominate the unsteady behavior of the flow downstream of a right-angled bend. Here, we summarize some of these experimental results, and discuss their implications for the understanding of turbulence structure.

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