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POD Analysis of the Wake Behind a Foamed and a Finned Cylinder MORTEZA KHASHEHCHI, KAMEL HOOMAN, The University of Queensland, THOMAS ROESGEN, ETH Zurich, ANDREW OOI, The University of Melbourne, QGECE COLLABORATION, WALTER BASSET LABORATORY COLLABORATION, INST. OF FLUID DYNAMICS COLLABORATION — Particle Image Velocimetry (PIV) has been carried out to investigate the wake region behind a foamed and a finned cylinder. The experiments are conducted for a wide range of Reynolds numbers from 1000 to 10000. Two dimensional results of planar PIV reveal the important aspects of the local flow features of the circular finned and foamed cylinders. These include turbulent boundary layer development over the surface and a delayed separation of the flow resulting in a smaller wake size in each case. The application of Proper Orthogonal Decomposition (POD) to the PIV velocity fields of the two cylinder types is also discussed. The POD computed for the measured velocity fields for all cases shows that the first two spatial modes are contained most of the kinetic energy of the flow irrespective to the cylinder type. These two modes are also responsible for the large-scale coherence of the fluctuations. For three different cylinder types, the first four eigenmodes of the flow field were calculated and their structures were analyzed. The first four eigenmodes reveal the details about the global mean flow structure, with the large-scale structure being mainly related to the most energetic flow motion.

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