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Dynamic Mode Decomposition of PIV measurements for the cylinder wake flow in turbulent regime[1] LAURENT CORDIER, GILLES TISSOT, NICOLAS BENARD, BERND R. NOACK, Institute PPRIME, France — For historical reasons, Proper Orthogonal Decomposition (POD) is the most well-known and used reduction approach in the turbulence community. POD is widely used since it extracts from a sequence of data an orthonormal basis which captures optimally the flow energy. Unfortunately, energy level is not necessarily the correct criterion in terms of dynamical modelling and deriving a dynamical system based on POD modes leads sometimes to irrelevant models. In this communication, the Dynamic Mode Decomposition (DMD) as recently proposed by Schmid (JFM 2010) will be used to determine the eigenvalues and eigenvectors of the Koopman operator (Rowley *et al.*, JFM 2009), an infinite-dimensional linear operator associated with the full nonlinear system. Without explicit knowledge of the dynamical operator, frequencies and growth rates associated to each DMD modes can be easily determined based on the eigenvalues. The DMD will be demonstrated on experimental data corresponding to a PIV dataset of a cylinder wake flow at Reynolds number 40000. Moreover, the link between DMD and temporal discrete Fourier transform will be analysed and discussed.

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