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Three-component POD of an axisymmetric wake behind a disk

MURAT TUTKUN, PETER B.V. JOHANSSON, Turbulence Research Laboratory, Department of Applied Mechanics, Chalmers University of Technology, Gothenburg - Sweden, SE-412 96 — A comparison between the one- and three- component Proper Orthogonal Decomposition (POD) of an axisymmetric wake behind a disk is presented in this talk. The high Reynolds number axisymmetric wake behind a disk has previously been studied using one-component (streamwise) POD in a cross-section of the flow.¹ It was found that the energetic structure of the axisymmetric wake can very efficiently be described in terms of POD modes. The POD revealed that two major features dominated the wake, one peaking at azimuthal mode-1 and at the Strouhal frequency and the other at azimuthal mode-2 and at near-zero frequency. The mode-1 peak dies off faster than the mode-2 peak, so that the far wake ($x/D \geq 50$) is dominated by the latter. The aim of the present investigation is to find out if three- dimensional decomposition shows the same features as the one-dimensional.

¹Johansson, P.B.V. and George, W.K., *The far downstream evolution of the high Reynolds number axisymmetric wake behind a disk. Part 2. Slice proper orthogonal decomposition*, Journal of Fluid Mechanics, Accepted for publication, 2005.

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