

Abstract Submitted  
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**Vorticity POD Modes for Low-Order Modeling of Synthetic-Jet Actuated Flow Past a NACA 4415 Airfoil Undergoing Time-Periodic Pitching Motion**<sup>1</sup> GUY BEN-DOV, ARNE J. PEARLSTEIN, Department of Mechanical Science & Engineering, University of Illinois at Urbana-Champaign, DAN BRZOZOWSKI, ARI GLEZER, School of Mechanical Engineering, Georgia Institute of Technology — We describe construction of two-dimensional modes by proper orthogonal decomposition (POD) of velocity and vorticity data obtained by two-component PIV measurements in turbulent flow past a NACA 4415 airfoil undergoing time-periodic pitching motion due to synthetic-jet actuation near the trailing edge. We show how modes constructed using nonsimultaneous data on adjacent spatial windows can be “stitched together” to produce nonoptimal (i.e., not POD) modes, that can be used to reconstruct phase-averaged data taken nonsimultaneously in the two windows. The use of “globalized” vorticity modes stitched together from nonsimultaneous data in low-order modeling for feedback control is also discussed.

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