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Reynolds number effects on the dynamics of the turbulent horseshoe vortex: High resolution experiments and numerical simulations NIKOLAOS APSILIDIS, SAM RABEN, PANAYIOTIS DIPLAS, CLINTON DANCEY, PAVLOS VLACHOS, Virginia Tech, ALI KHOSRONEJAD, FOTIS SOTIROPOULOS, University of Minnesota — Turbulent flows past wall-mounted obstacles are dominated by dynamically rich, slowly evolving coherent structures producing most of the turbulence in the junction region. Numerical simulations [Paik et al., *Phys. of Fluids* 2007] elucidated the large-scale instabilities but important questions still remain unexplored. One such question is with regard to the effect of the Reynolds number on the dynamics of the turbulent horseshoe vortex (THV). We carry out high-resolution laboratory experiments for the flow past a wall mounted cylinder in a laboratory water tunnel for Re_D= 26000, 48000 and 117000. We employ the Time-Resolved Particle Image Velocimetry technique to resolve the dynamics of the flow at the symmetry plane of the cylinder and analyze the instantaneous velocity fields using the Proper Orthogonal Decomposition technique. The experimental study is integrated with coherent-structure-resolving numerical simulations providing the first comprehensive investigation of Reynolds number effects on the dynamics of the THV.

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