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Tip vortex characteristics of rotor in hover SWATHI M. MULA, CHRISTOPHER G. CAMERON, CHARLES E. TINNEY, JAYANT SIROHI, The University of Texas at Austin — Vortices emanating from the tip of the rotor blades comprise four distinct regions of flow: laminar, transitional, turbulent, and irrotational flows. To investigate the structural instabilities associated with various flow regions within the vortex, the current investigation employs the proper orthogonal decomposition (POD) technique. This technique is applied to blade tip vortices emanated from a reduced-scale, 1.0 m diameter, single-bladed rotor in hover. The rotor is operated at 1500 RPM which corresponds to a $Re_{tip} = 218,000$ and $M_{tip} = 0.23$; and at a collective pitch angle of 7.3° . Measurements are undertaken using a two-component PIV system, at various vortex ages. An effort is also made to ensure that there is sufficient resolution within the tip vortex region, to enable the study of local instabilities associated with various flow regions within the vortex.

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