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Experimental Study of Vortex Dynamics during Blade-Vortex Interactions DI PENG, JAMES GREGORY, The Ohio State University — Vortices incident upon bodies, such as cylinders, airfoils, and rotor blades, can give rise to substantial unsteady loading, sound generation, and vibration in a variety of engineering applications. A comprehensive study on vortex dynamics during blade-vortex interaction (BVI) is performed in this work. Evidence has been found in previous studies that the vortex behavior during BVI varies with Reynolds number, but the effects are not clear. In the current study, the experiments are performed in a 3' $\times$ 5' low speed wind tunnel where the Reynolds number can be varied from 6×10^4 to 8×10^5 by adjusting freestream speed and airfoil size. The vortex is generated by the pitching motion of a wing, which is driven by an air cylinder. Another wing is placed downstream to initiate parallel interactions with the generated vortices. Smoke visualization is used originally to characterize the vortex. Then the BVI problem is studied in detail using time-resolved PIV and unsteady pressure measurements on the downstream target airfoil. The vortex behaviors at selected Reynolds numbers are investigated. The influence of other factors on vortex behavior, such as vortex strength and core size, is also discussed.

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