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Vortex wake of tip loaded rotors at low Reynolds numbers OMER SAVAS, ONUR BILGI, Univ of California - Berkeley — The effect of tip tabs on the flow characteristics of a three bladed rotor is investigated using strain gauge thrust measurements, flow visualization and particle image velocimetry at chord Reynolds numbers of $0.4 - 2.9 \times 10^5$. The tab angles of attack of 0, $\mp 3^\circ$ & $\mp 5^\circ$ with respect to the rotation of the rotor are used to vary the tip loading. The rotor wakes and thrust characteristics at positive angles of attack, when the tip loading is outward, are qualitatively similar to those with no-tabs. In contrast, when the tip loading is inward at zero and negative angles of attack, the vortex wake is radically altered; the thrust nearly vanishes, even reverses with increasing inward loading. The key factors influencing the behavior of the wake are the vortex system off the tabs and their associated *downwash*, which is inward for the outward tab loading and causes increased volume and momentum flux and outward for the inward tab loading and causes expansion of the wake and nearly complete loss of thrust. At negative angles of attack, the flow fields exhibit a quasi-steady bound ring vortex system around at the edge of the rotor disk and the flow direction on the pressure side of the rotor disk reverses: it flows toward the rotor disk.

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