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Dynamic flow reattachment on a rotating blade undergoing dynamic stall VRISHANK RAGHAV, NARAYANAN KOMERATH, Georgia Institute of Technology — A 2-bladed rigid rotor undergoing retreating blade dynamic stall in a low-speed wind tunnel was used to study the 3-dimensional flow reattachment at the end of the dynamic stall cycle. Phase-locked stereoscopic Particle Image Velocimetry was used to capture the velocity field during reattachment. Continuing from prior studies on the inception and progression of 3-D rotating dynamic stall for this test case, phase-resolved, ensemble-averaged results are presented for different values of rotor advance ratio at varying spanwise stations along the blade. The results show the nominal reattachment getting delayed in rotor azimuth with higher advance ratio. At low advance ratio reattachment starts at the leading-edge and progresses towards the trailing-edge with vortex shedding transporting excess vorticity away from the leading-edge. At higher advance ratio, vortex shedding is not observed, instead the vortical structure shrinks in size while the flow close to the trailing-edge appears to reattach. At the higher advance ratio conditions, spanwise vorticity transport appears to be the mechanism to transport excess vorticity away from the leading-edge. The possible causes for a switch in mechanism of vorticity transport are also presented.

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