Study of blade to blade flows and circumferential stall propagation in radial diffusers and radial fans by vortex cloud analysis

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The objective of this paper is extension of vortex cloud simulation to the study of deep rotating stall cell propagation in radial turbomac hines. Previous studies [1][2] provided the basic analysis, summarized in part here, for radial and mixed-flow blade rows but with identical bl ade-to-blade flow. Lifting of this restriction here permits the natural development of circumferential flow variations, revealing the growth o f major upstream rotating stall cells for a radial di®user with ten log-spiral blades but with high angle of attack (deep stall). For the same blad e row run as a radial fan, however, stall cell formation and propagation is found to be inhibited. Additional studies are included for a cambere d blade geometry typical of axial compressors. Used as an eight bladed radial di®user, classical rotating stall is predicted. When operated a s a rotor, rotating is again inhibited and modi¯ed.

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