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Circulation and liftEfficiency of a compressor cascade; Performance of two-dimensional cascades; The cascade wind tunnel; Cascade test results; Compressor cascade performance; Turbine cascade performance; Compressor cascade correlations; Fan blade design (McKenzie); Turbine cascade correlation (Ainley and Mathieson); Comparison of the profile loss in a cascade and in a turbine stage; Optimum space-chord ratio of turbine blades (Zweifel); References; Problems; Chapter 4. Axial-flow Turbines: Two-dimensional Theory; Introduction; Velocity diagrams of the axial turbine stage Thermodynamics of the axial turbine stageStage losses and efficiency; Soderberg's correlation; Types of axial turbine design; Stage reaction; Diffusion within blade rows; Choice of reaction and effect on efficiency; Design point efficiency of a turbine stage; Maximum total-to-static efficiency of a reversible turbine stage; Stresses in turbine rotor blades; Turbine flow characteristics; Flow characteristics of a multistage turbine; The Wells turbine; Pitch-controlled blades; References; Problems; Chapter 5. Axial-flow Compressors and Fans; Introduction Two-dimensional analysis of the compressor stageVelocity diagrams of the compressor stage; Thermodynamics of the compressor stage; Stage loss relationships and efficiency; Reaction ratio; Choice of reaction; Stage loading; Simplified off-design performance; Stage pressure rise; Pressure ratio of a multistage compressor; Estimation of compressor stage efficiency; Stall and surge phenomena in compressors; Control of flow instabilities; Axial-flow ducted fans; Blade element theory; Blade element efficiency; Lift coefficient of a fan aerofoil; References; Problems
Chapter 6. Three-dimensional Flows in Axial Turbomachines

Sommario/riassunto

The new edition will continue to be of use to engineers in industry and technological establishments, especially as brief reviews are included on many important aspects of Turbomachinery, giving pointers towards more advanced sources of information. For readers looking towards the wider reaches of the subject area, very useful additional reading is referenced in the bibliography. The subject of Turbomachinery is in continual review, and while the basics do not change, research can lead to refinements in popular methods, and new data can emerge. This book has applications for professiona