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2.5.1 Continuity Equation2.5.2 Momentum Equation; 2.5.3 Energy Equation; 2.5.4 Entropy Equation; 2.6 Integral Form of Governing Equations; 2.6.1 Continuity Equation; 2.6.2 Momentum Equation; 2.6.3 Energy Equation; 2.7 A Collection of the Basic Relationships for Non-Orthogonal Coordinates; 2.8 Summary; 3 Introduction to Boundary Layer Theory; 3.1 Introduction; 3.2 General Concepts of the Boundary Layer; 3.2.1 Nature of Boundary Layer Flow; 3.2.2 Boundary Layer Thicknesses; 3.2.3 Transition of the Boundary Layer Regime; 3.2.4 Boundary Layer Separation; 3.2.5 Thermal Boundary Layer; 3.3 Summary
4 Numerical Solutions of Boundary Layer Differential Equations4.1 Introduction; 4.2 Boundary Layer Equations Expressed in Partial Differential Form; 4.2.1 Two-Dimensional Laminar Boundary Layer Equations; 4.2.2 Laminar Boundary Layer Equations of Axisymmetrical Flow; 4.2.3 Turbulent Boundary Layer Equations; 4.2.4 Boundary Conditions of Solution; 4.3 Numerical Solution of the Boundary Layer Differential Equations for a Cascade on the Stream Surface of Revolution; 4.3.1 Boundary Layer Equations of S1 Stream Surface Flow of Revolution and Their Solution; 4.3.2 Turbulence Modeling
4.4 Calculation Results and Validations4.4.1 Laminar Boundary Layer Calculation Example; 4.4.2 Turbulent Boundary Layer with Favorable Pressure Gradient; 4.4.3 Turbulent Boundary Layer with Adverse Pressure Gradient (Ludweig and Tillmann); 4.4.4 Turbulent Boundary Layer with Favorable Pressure Gradient (Bell); 4.4.5 Turbulent Boundary Layer with Adverse Pressure Gradient (Schubauer and Spangenberg); 4.5 Application to Analysis of the Performance of Turbomachinery Blade Cascades; 4.5.1 Boundary Layer Momentum Thickness (Bammert's Experiment)
4.5.2 Laminar Boundary Layer Prediction (Turbine and Compressor Blade Profiles)

Sommario/riassunto

Computational Fluid Dynamics (CFD) is now an essential and effective tool used in the design of all types of turbomachine, and this topic constitutes the main theme of this book. With over 50 years of experience in the field of aerodynamics, Professor Naixing Chen has developed a wide range of numerical methods covering almost the entire spectrum of turbomachinery applications. Moreover, he has also made significant contributions to practical experiments and real-life designs. The book focuses on rigorous mathematical derivation of the equations governing flow and detailed descriptions of th

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