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Equation; 2.6 THE THERMODYNAMIC ENERGY EQUATION; 2.7 THERMODYNAMICS OF THE DRY ATMOSPHERE; 2.7.1 Potential Temperature; 2.7.2 The Adiabatic Lapse Rate; 2.7.3 Static Stability; 2.7.4 Scale Analysis of the Thermodynamic Energy Equation; PROBLEMS 2; MATLAB EXERCISES 2; Suggested References 2; 3. Elementary Applications of the Basic Equations; 3.1 BASIC EQUATIONS IN ISOBARIC COORDINATES; 3.1.1 The Horizontal Momentum Equation; 3.1.2 The Continuity Equation; 3.1.3 The Thermodynamic Energy Equation; 3.2 BALANCED FLOW
3.2.1 Natural Coordinates 3.2.2 Geostrophic Flow; 3.2.3 Inertial Flow; 3.2.4 Cyclostrophic Flow; 3.2.5 The Gradient Wind Approximation; 3.3 TRAJECTORIES AND STREAMLINES; 3.4 THE THERMAL WIND; 3.4.1 Barotropic and Baroclinic Atmospheres; 3.5 VERTICAL MOTION; 3.5.1 The Kinematic Method; 3.5.2 The Adiabatic Method; 3.6 SURFACE PRESSURE TENDENCY; PROBLEMS 3; MATLAB EXERCISES 3; 4. Circulation and Vorticity; 4.1 THE CIRCULATION THEOREM; 4.2 VORTICITY; 4.2.1 Vorticity in Natural Coordinates; 4.3 POTENTIAL VORTICITY; 4.4 THE VORTICITY EQUATION; 4.4.1 Cartesian Coordinate Form 4.4.2 The Vorticity Equation in Isobaric Coordinates 4.4.3 Scale Analysis of the Vorticity Equation; 4.5 VORTICITY IN BAROTROPIC FLUIDS; 4.5.1 The Barotropic (Rossby) Potential Vorticity Equation; 4.5.2 The Barotropic Vorticity Equation; 4.6 THE BAROCLINIC (Ertel) POTENTIAL VORTICITY EQUATION; 4.6.1 Equations of Motion in Isentropic Coordinates; 4.6.2 The Potential Vorticity Equation; 4.6.3 Integral Constraints on Isentropic Vorticity; PROBLEMS 4; MATLAB EXERCISES 4; Suggested References 4; 5. The Planetary Boundary Layer; 5.1 ATMOSPHERIC TURBULENCE; 5.1.1 The Boussinesq Approximation 5.1.2 Reynolds Averaging

Sommario/riassunto

This revised text presents a cogent explanation of the fundamentals of meteorology, and explains storm dynamics for weather-oriented meteorologists. It discusses climate dynamics and the implications posed for global change. The Fourth Edition features a CD-ROM with MATLAB® exercises and updated treatments of several key topics. Much of the material is based on a two-term course for seniors majoring in atmospheric sciences. * Provides clear physical explanations of key dynamical principles * Contains a wealth of illustrations to elucidate text and equations, plus end-of-chapter pr