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Problems; Chapter 3 Fundamentals of Energy Transfer in Centrifugal Pumps; 3.1 Main Components of the Centrifugal Pump; 3.2 Energy Transfer from the Pump Rotor to the Fluid; 3.2.1 The Angular Momentum Equation; 3.2.2 Application of Angular Momentum Equation to the Centrifugal Pump Impeller; 3.3 Theoretical Characteristic Curves; 3.3.1 Theoretical H-Q Characteristics
3.3.2 Relationship between Impeller Vane Shape and Pump Efficiency3.3.3 Theoretical Relationship between Impeller Vane Shape and Pump Power Consumption; 3.4 Deviation from Theoretical Characteristics; 3.4.1 Effect of Circulatory Flow on the Impeller Input Head; 3.4.2 Effect of Various Losses on Pump Performance; 3.5 Leakage Losses; 3.6 Mechanical Losses; 3.7 Relationship between the Overall Efficiency and Other Efficiencies; 3.8 Flow Rate Control in Pumping Systems; 3.8.1 Speed Control of the Prime Mover; 3.8.2 Delivery Valve Throttling; 3.8.3 Using Inlet Guide Vanes for Flow Rate Control
3.8.4 Using Impellers with Adjustable Vanes3.8.5 Impeller Trimming; 3.8.6 Using Bypass for Flow Rate Control; 3.8.7 Flow Rate Control by Operating Pumps in Parallel or in Series; 3.8.8 Use of a Storage Tank; References; Problems; Chapter 4 Axial and Radial Thrusts in Centrifugal Pumps; 4.1 Introduction; 4.2 Axial Thrust; 4.2.1 Calculation of the Unbalanced Axial Thrust; 4.3 Methods of Balancing the Axial Thrust; 4.3.1 Balancing Axial Thrust Using Pump-out Vanes; 4.3.2 Balancing Axial Thrust Using Balancing Chambers; 4.3.3 Balancing Axial Thrust in Double-Suction and Multistage Pumps
4.3.4 Other Balancing Systems

Sommario/riassunto

Pumping Machinery Theory and Practice comprehensively covers the theoretical foundation and applications of pumping machinery. Key features: Covers characteristics of centrifugal pumps, axial flow pumps and displacement pumpsConsiders pumping machinery performance and operational-type problemsCovers advanced topics in pumping machinery including multiphase flow principles, and two and three-phase flow pumping systemsCovers different methods of flow rate control and relevance to machine efficiency and energy consumptionCovers different methods of flow rate control and relevance to machine effi