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Sommario/riassunto	This open access book presents a series of complicated hydraulic phenomena and related mechanism of high-speed flows in head-head dam. According to the basic hydraulic theory, detailed experiments and numerical simulations, microscopic scale analysis on cavitation bubbles, air bubbles, turbulent eddy vortices and sand grains are examined systematically. These investigations on microscopic fluid mechanics, including cavitation erosion, aeration protection, air–water flow, energy dissipation and river-bed scouring, allow a deep understanding of hydraulics in high-head dams. This book provides reference for designers and researchers in hydraulic engineering, environment engineering and fluid mechanics.