



METADATA

Title: Fluid Machines

Other Titles: Theoretical Approach - Applications

Language: Greek

ISBN: 978-960-603-216-5

Subject: ENGINEERING AND TECHNOLOGY

Keywords: Turbomachinery / Pumps / Turbines / Fans / Compressors

Bibliographic Reference: Tsirikoglou, T., & Vlachogiannis, M. (2015). Fluid Machines [Undergraduate textbook]. Kallipos, Open Academic Editions. <http://dx.doi.org/10.57713/kallipos-938>

Abstract

The textbook aims to: 1. Familiarize the reader with the basic parameters and fundamental laws governing open systems (fluid flow). 2. To familiarize the reader with fluid dynamic machines (pumps, turbines, fans, compressors, turbo engines). 3. To provide basic knowledge for calculating the quantities that characterize fluid phenomena, as well as for designing fluid dynamic machines (pumps and turbines). In summary, the textbook aims to present in an understandable way: The laws of continuity, energy, momentum, and angular momentum in open fluid systems. The forces exerted (lift, drag) on moving surfaces or bodies in a fluid (wind turbine blades). The thrust and mechanical efficiency of propellers, as well as the thrust of jet engines and rockets. The types of fluid dynamic machines and their classification. The description, operation, and comparison of piston and rotary

engines. Detailed examination of the centrifugal pump (theoretical approach, speed triangles, testing, characteristic curves, the cavitation phenomenon and how to avoid it). The design, installation, and operation of a pumping unit. The design, installation, and operation of centrifugal and axial fans and air compressors. The design and operation of Pelton, Francis, and Kaplan water turbines (water turbine theory, speed triangles, characteristic curves, installation and operation of a hydroelectric unit). The operating characteristics and design of steam turbines. Modern gas turbine technology and its application in electricity generation, in the supercharging of Internal Combustion Engines (ICE), and in aircraft jet engines. Finally, summary data are presented on compressible flow, the Mach number, isentropic gas flow, and shock waves (vertical and lateral).

