

**FLUID MECHANICS
COLLECTION**

Principles of Hydraulic Systems Design



Second Edition

Peter Chapple



**MOMENTUM PRESS
ENGINEERING**

PRINCIPLES OF HYDRAULIC SYSTEMS DESIGN

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PETER CHAPPLE



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ABSTRACT

This is the second edition of the book which was published in 2002. Fluid power systems are manufactured by many organizations for a very wide range of applications, which often embody differing arrangements of components to fulfill a given task. Hydraulic components are manufactured to provide the control functions required for the operation of a wide range of systems and applications. This second edition of the book is structured so as to give an understanding of:

- The basic types of components, their operational principles and the estimation of their performance in a variety of applications. Component manufacturer diagrams are included to aid the understanding of the mechanical principles involved. This second edition has added a description of the digital control methods for independently operated valves for pumps and motors.
- A resume of the flow processes that occur in hydraulic components.
- A review of the modeling process for the efficiency of pumps and motors. This second edition includes an analysis for estimating the mechanical loss in a typical hydraulic motor.
- The way in which circuits can be arranged using available components to provide a range of functional system outputs. This includes the analysis and design of closed loop control systems and some applications.
- The analytical methods that are used in system design and the prediction of steady state and dynamic performance in a range of applications. This second edition deals more extensively with the analysis of hydraulic circuits for different types of hydrostatic power transmission systems and their application.
- This second edition also includes a description of the use of international standards in the design and management of hydraulic systems.

KEYWORDS

closed loop control systems, contamination control filters, digital displacement control of pumps and motors, flow and pressure control valves,

flow loss, fluid bulk modulus, fluid compressibility, fluid pressure loss, fluid viscosity, hydraulic circuits, hydraulic cylinders, hydraulic filters, hydraulic pumps and motors, hydraulic seals, hydrostatic transmissions, international standards, mechanical efficiency, mechanical power loss, oil coolers, oil flow process, pressurized gas accumulators, proportional valves, pump and motor displacement control, volumetric efficiency, volumetric power loss

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