

## Module 5: Hydraulic Systems

### Lecture 1

#### Introduction

##### 1. Introduction

The controlled movement of parts or a controlled application of force is a common requirement in the industries. These operations are performed mainly by using electrical machines or diesel, petrol and steam engines as a prime mover. These prime movers can provide various movements to the objects by using some mechanical attachments like screw jack, lever, rack and pinions etc. However, these are not the only prime movers. The enclosed fluids (liquids and gases) can also be used as prime movers to provide controlled motion and force to the objects or substances. The specially designed enclosed fluid systems can provide both linear as well as rotary motion. The high magnitude controlled force can also be applied by using these systems. This kind of enclosed fluid based systems using pressurized incompressible liquids as transmission media are called as hydraulic systems. The hydraulic system works on the principle of Pascal's law which says that the pressure in an enclosed fluid is uniform in all the directions. The Pascal's law is illustrated in figure 5.1.1. The force given by fluid is given by the multiplication of pressure and area of cross section. As the pressure is same in all the direction, the smaller piston feels a smaller force and a large piston feels a large force. Therefore, a large force can be generated with smaller force input by using hydraulic systems.

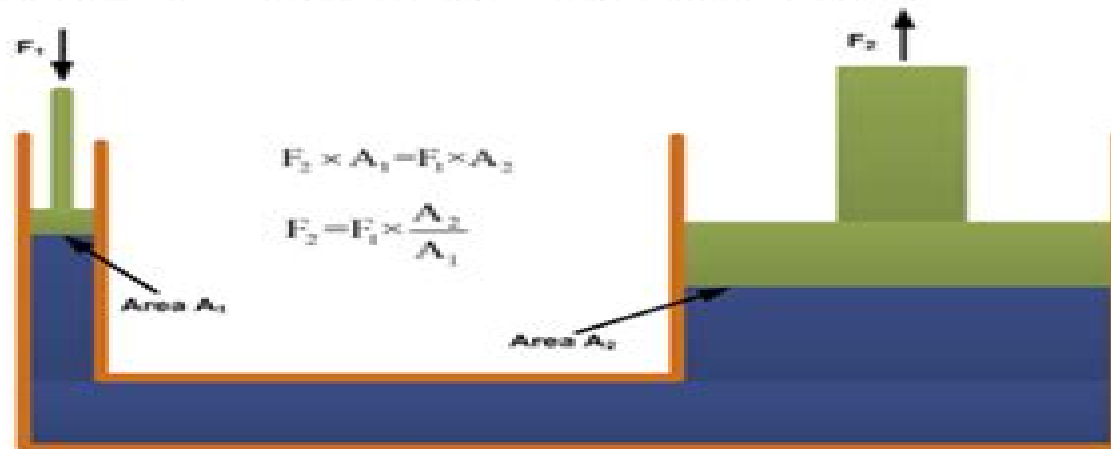


Figure 5.1.1 Principle of hydraulic system

# Module 5 Hydraulic Systems Lecture 1 Introduction

**Xiaolong Qi**



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**Bowker's Complete Video Directory**, 2000      **Fluid Mechanics and Fluid Power (Vol. 3)** Suvanjan

Bhattacharyya, Saket Verma, A. R. Harikrishnan, 2023-04-17 This book presents the select proceedings of the 48th National Conference on Fluid Mechanics and Fluid Power FMFP 2021 held at BITS Pilani in December 2021 It covers the topics such as fluid mechanics measurement techniques in fluid flows computational fluid dynamics instability transition and turbulence fluid structure interaction multiphase flows micro and nanoscale transport bio fluid mechanics aerodynamics turbomachinery propulsion and power The book will be useful for researchers and professionals interested in the broad field of mechanics

The 2002 Guide to the Evaluation of Educational Experiences in the Armed Services American Council on Education, American Council on Education Staff, 2005 Long considered to be the standard reference work in this area this three volume set describes more than 8 000 courses offered between January 1990 and the present by various service branches and the Department of Defense Long considered to be the standard reference work in this area this three volume set describes more than 8 000 courses offered between January 1990 and the present by various service branches and the Department of Defense      *Theory And Practice Of Control And Systems - Proceedings Of The 6th Ieee Mediterranean Conference* Antonio Tornambe, Giuseppe Conte, Anna Maria Perdon, 1999-01-04 This volume gathers together all the lectures presented at the 6th IEEE Mediterranean Conference It focuses on the mathematical aspects in the theory and practice of control and systems including stability and stabilizability robust control adaptive control robotics and manufacturing these topics are under intense investigation and development in the engineering and mathematics communities The volume should have immediate appeal for a large group of engineers and mathematicians who are interested in very abstract as well as very concrete aspects of control and system theory      **Robots** Society of Manufacturing Engineers Staff, 1984-06      Guide to the Evaluation of Educational Experiences in the Armed Services American Council on Education, 2000      Scientific and Technical Aerospace Reports , 1979      *Control of Variable-Geometry Vehicle Suspensions* Balázs Németh, Péter Gáspár, 2023-07-08 This book provides a thorough and fresh treatment of the control of innovative variable geometry vehicle suspension systems A deep survey on the topic which covers the varying types of existing variable geometry suspension solutions introduces the study The book discusses three important aspects of the subject robust control design nonlinear system analysis and integration of learning and control methods The importance of variable geometry suspensions and the effectiveness of design methods implemented in the autonomous functionalities of electric vehicles functionalities like independent steering and torque vectoring are illustrated The authors detail the theoretical background of modeling control design and analysis for each functionality The theoretical results achieved through simulation examples and hardware in the loop scenarios are confirmed The book highlights emerging ideas of applying machine learning based methods in the control system with guarantees on safety performance The authors propose novel control methods based on the theory of robust

linear parameter varying systems with examples for various suspension systems Academic researchers interested in automotive systems and their counterparts involved in industrial research and development will find much to interest them in the eleven chapters of Control of Variable Geometry Vehicle Suspensions     **Robots 8: Applications for today** ,1984

*Underwater Structures* Piero Caridis,2025-05-28 Underwater Structures provides the necessary background theory of shell structures for the geometries encountered in submarine pressure hulls and deep diving submersibles Both analysis and design issues are considered using analytical as well as numerical approaches Classical thin walled structures theory is implemented and both elastic stability and collapse are considered for all types of structural geometries presented These include ring stiffened cylindrical shells spheres hemispherical shells truncated cones and torispherical end closures This book also discusses structural design issues including the selection of materials and the use of design codes This book is suitable for university students at both the undergraduate and postgraduate level and it also serves as a reference text for academic teachers engineering professionals and researchers Key Features Covers various types of submarines both naval and civilian and deep diving submersibles Presents the latest in submersible structural design and includes both classical structures theory and finite element procedures Includes coverage of corrosion and fatigue in submarine structures

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