Module Strength *of* Materials 1

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Preface

This module provides engineering students the fundamental knowledge needed to understand the concept of mechanics on structures of a given material. Using this module, engineering students should be able to develop an understanding on the strength of a material/structure, analyse the given problem and demonstrates solution in a logical approach using the basic and principles as presented in this module. This module was designed to be the first part of the course for strength of materials (or also known as mechanics of materials in some other institutions) in which a few chapters has been included, here. It is hoped that this module could make it easier for the students to understand the subject.

Acknowledgement

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Chapter 1 Introduction to Strength of Materials

Learning Objectives

- Distinguish between normal stress and shear stress.
- Identify different type of loads such as normal force, transverse force, bending moment and torque.

1.1 Introduction

Strength of materials is also known as mechanics of solid or mechanics of deformable bodies. The main objective of the study of strength of materials is to provide future engineers who are able to analyse and design various structures, machine and load-bearing structures without failure. Strength of materials theory has been applied in various area/fields including civil, biomechanics, construction, power generation, transportation, marine, mechanical system and etc. The analysis and design of the given structure involve the determination of stresses and deformation/strain. Two main stresses/strains in the strength of materials are normal stress/strain and shear stress/strain.

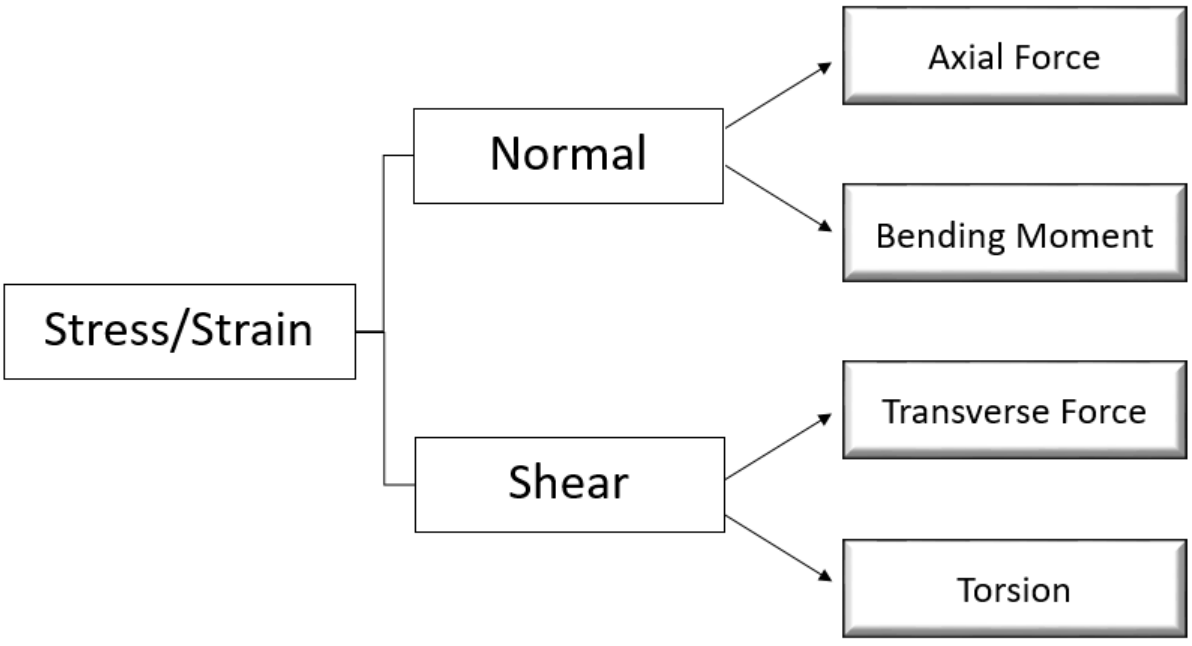

Figure 1.1: Type of stresses

Referring to Figure 1.1, the normal stress and strain are developed when the structure is subject to axial load/force and bending moment while shear stress and strain are developed due to transverse force and torsion. But, what is axial force, bending moment, transverse force and torsion? Could you differentiate between them?

1.2 Axial Load/Force

The member is said to be subjected to axial load when the load direction is perpendicular to the cross- section area of the member. Under this situation, normal stress (internal) and normal strain (internal) are developed in the member.

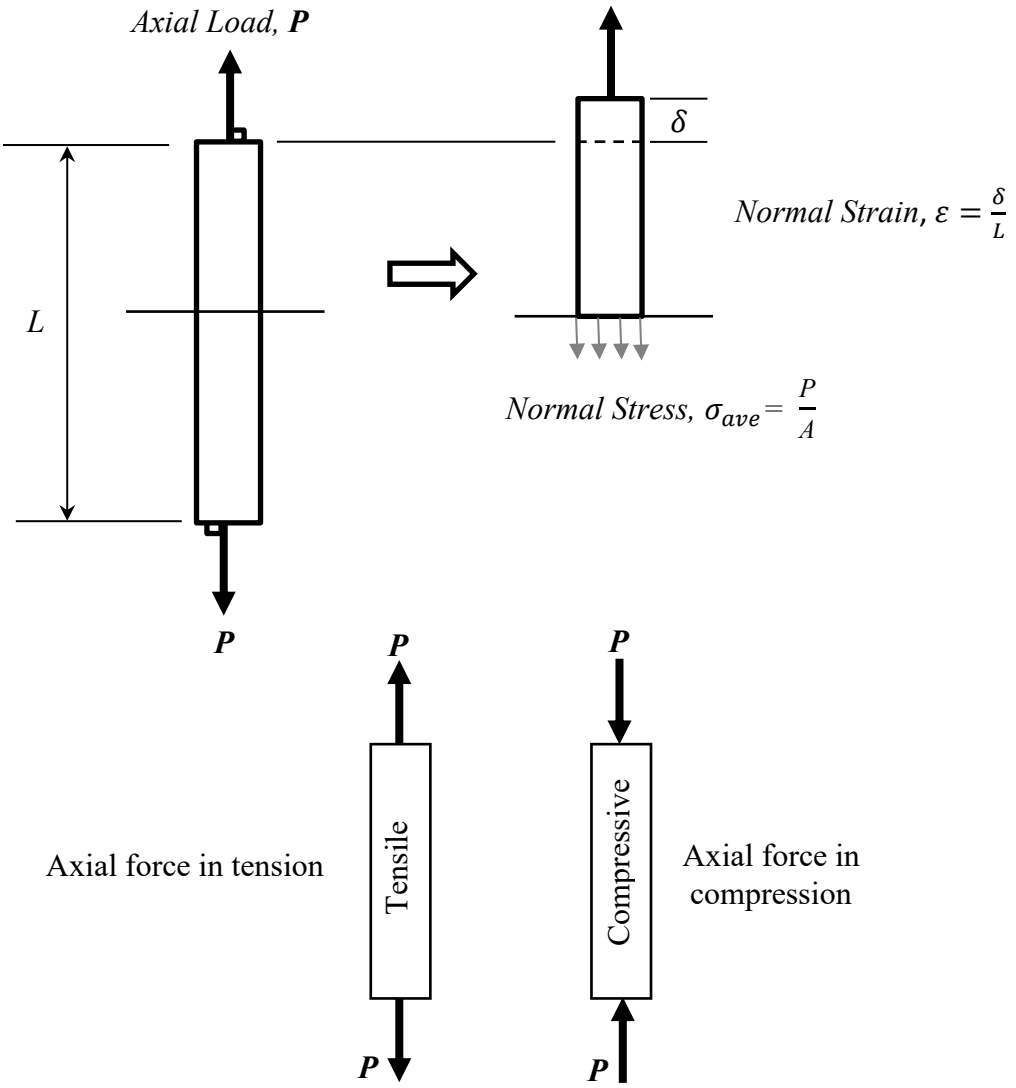

Figure 1.2: Member subjected to axial load