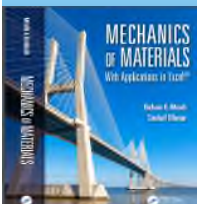


MECHANICS OF MATERIALS: WITH APPLICATIONS IN EXCEL CHAPTER 2: TORSIONAL LOADS

LECTURE 7

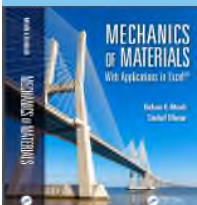
2.1 INTRODUCTION

2.2 INTERNAL TORQUE



Lecture Outline

- Introduction
- Internal Torque
- Examples

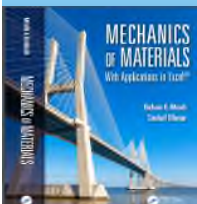


Lecture 7

Chapter 2. Torsional Loads

Introduction

- This topic deals with members subjected to torsional loads, namely, moments (couples) about the centroidal axes of such members.
- These types of moments or couples are generally referred to as torques and the members subjected to torques are generally known as shafts.
- Examples of these types of members include propeller shafts of ships and aircraft and drive shafts of automobiles, power tools, and other equipment.

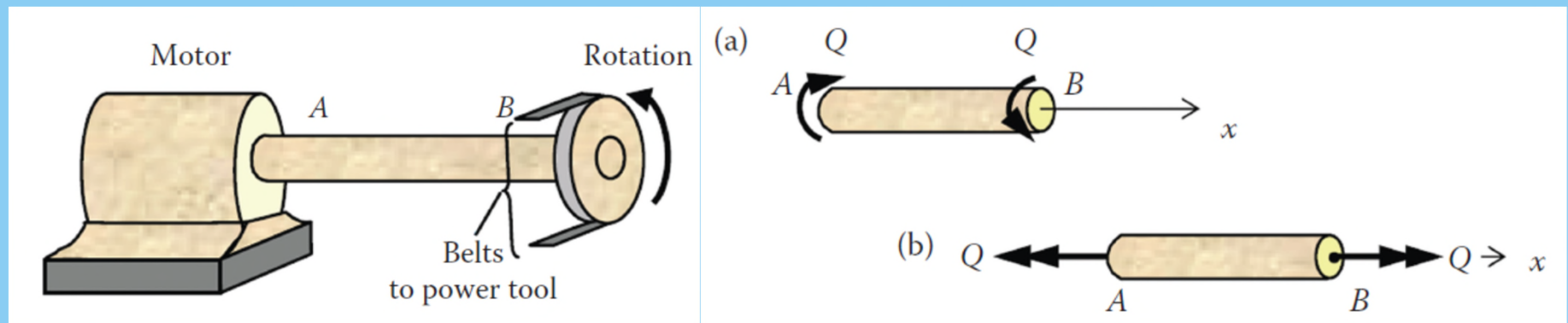


Lecture 7

Chapter 2. Torsional Loads

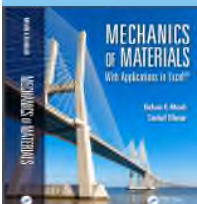
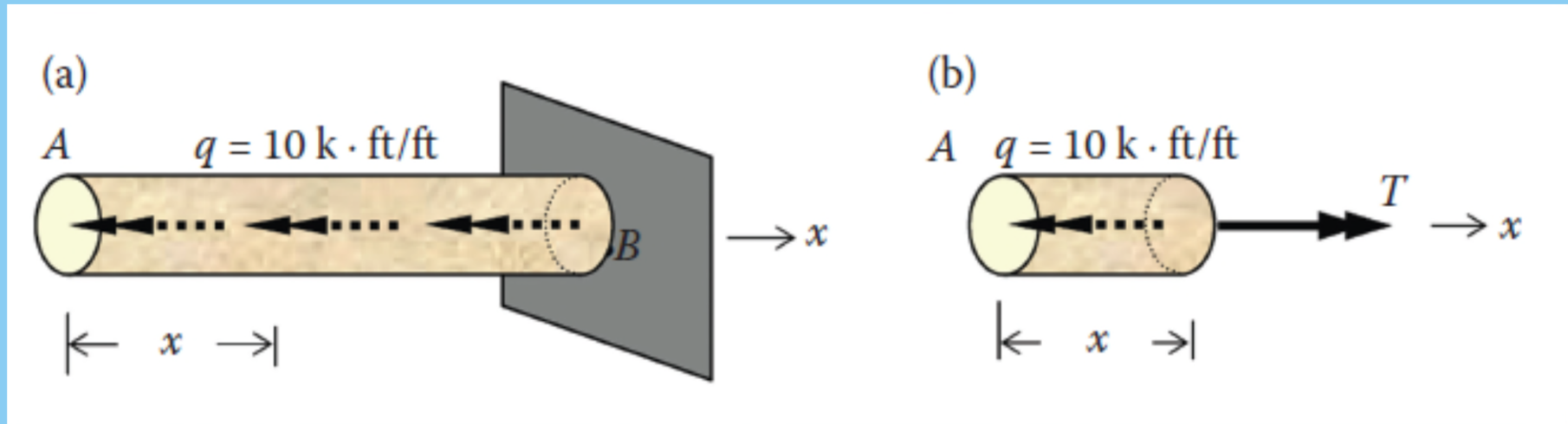
Concentrated Torque

- A concentrated torque may be defined as one that is applied over a very small area (assumed to be a point) of the member on which it acts.



Distributed Torque

- A distributed torque is applied over the length of a member.

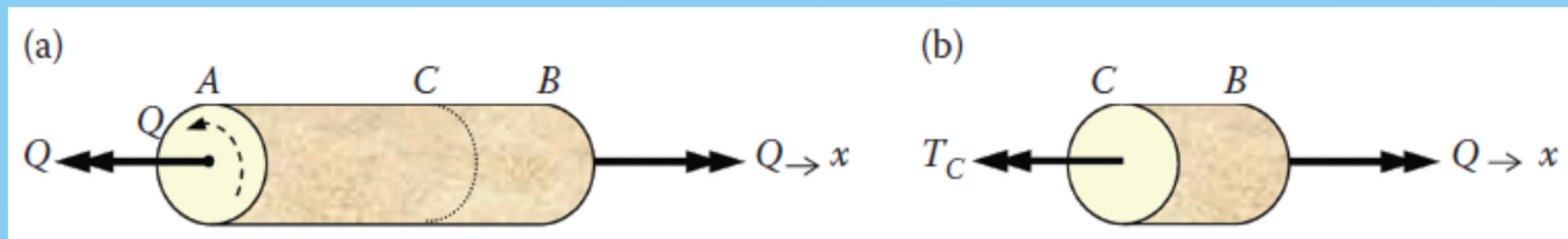


Lecture 7

Chapter 2. Torsional Loads

Internal Torque

- Internal torque at any location along the member is obtained by introducing a section at the location and applying equilibrium. The figure below illustrates the internal torque at C, T_C .



$$\sum T_x = 0 \Rightarrow Q - T_C = 0; \quad T_C = Q$$

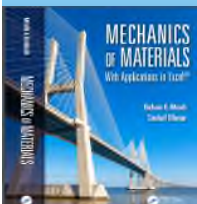
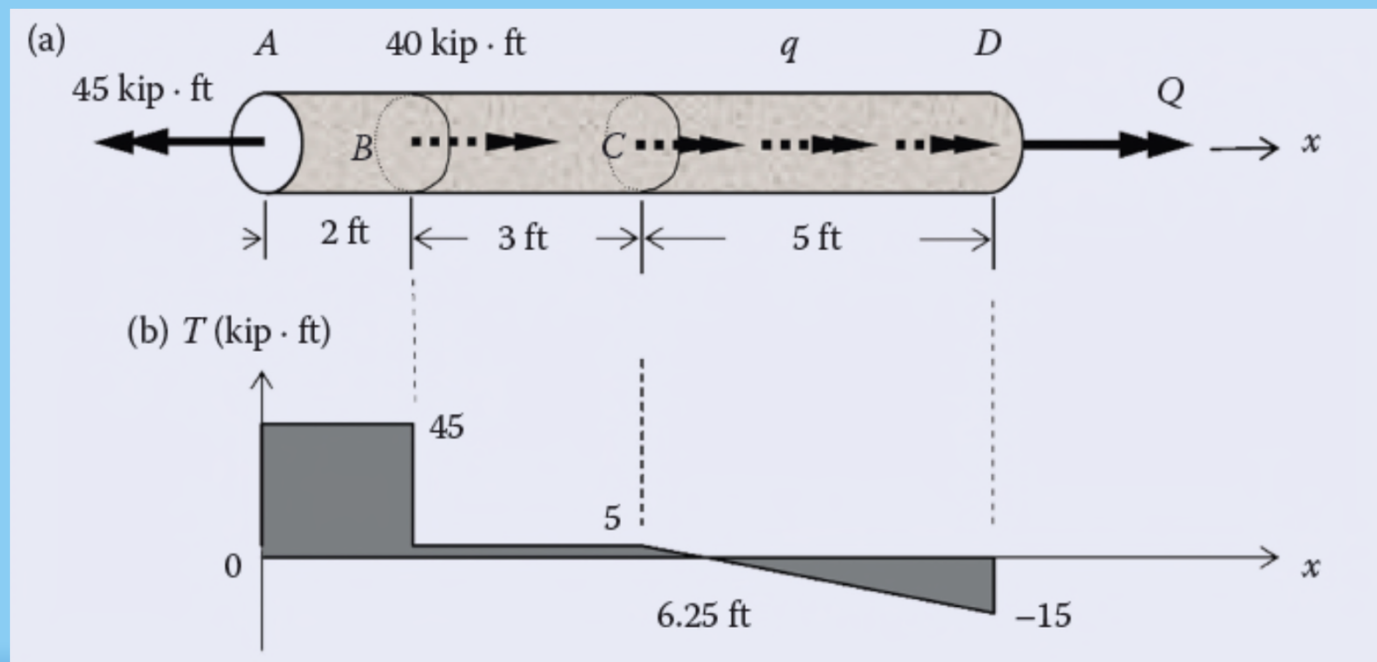
Sign Convention

- Torque is positive, if the two-headed vector representing it points away from the surface on which it acts, and negative, if it points into this surface.



Internal Torque Diagram

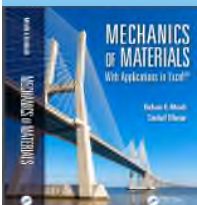
- An internal torque diagram is a diagram that shows, at a glance, how the internal torque changes from point to point along the length of the shaft



Lecture 7

Chapter 2. Torsional Loads

Examples



Lecture 7

Chapter 2. Torsional Loads