

PH201 Reading Week 7

Chapter 8: Equilibrium and Elasticity

In our short discourse in chapter 7 we have introduced torque. Torque is to rotational motion what force is to linear motion. Until now we've been mostly concerned with what makes objects move. Now we're going to investigate what makes objects *not* move. We are now dealing with *extended* objects, so that the locations at which the forces act become important: We are now dealing with cases where both forces *and* torques act. We will be discussing the choice of pivot point, similarly important to choosing a good coordinate system for linear motion.

The second part of the chapter is concerned with springs and elastic materials.

Student Learning Objectives

In covering the material of this chapter, students will learn to:

- To draw and make effective use of free-body diagrams.
- Understand the role of torque in determining the equilibrium of extended objects.
- Solve problems of equilibrium of extended objects, balancing forces, and torques.
- Use the position of the center of gravity and height to determine the relative stability of objects.
- Understand the nature of spring forces.
- Understand how spring-like restoring forces act during the stretching and compressing of rigid materials and biological materials.

Some questions that successful students can answer after reading the text

How do you calculate the torque on an object?

What is the condition of static equilibrium for an extended object?

How do you calculate the center of gravity of an extended object? (check chapter 7)

What is Hooke's Law?

Draw a graph showing the spring force as a function of the displacement of the spring

What is Young's Modulus?

What is tensile stress?

This chapter is short, but has a lot of applications. Check the conceptual questions and end of the chapter questions.