

## Chapter 9 Deflections Of Beams

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### Chapter 9 Deflections Of Beams

Chapter 9 Deflections of Beams 9.1 Introduction in this chapter, we describe methods for determining the equation of the deflection curve of beams and finding deflection and slope at specific points along the axis of the beam 9.2 Differential Equations of the Deflection Curve consider a cantilever beam with a concentrated load acting upward at the free end the deflection  $v$  is the displacement in the  $y$  direction

### Chapter 9 Deflections of Beams

Chapter 9 Deflections of Beams . 9.2 Differential Equations of the Deflection Curve Sign Conventions and Main Concepts 1. Deflection  $\delta$ : Displacement in  $y$ -direction at a point (upward positive) 2. Angle of rotation  $\theta$ : Angle between  $x$ -axis and  $t$ \_\_\_\_\_ to the deflection curve (counterclockwise positive) 3.

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9-18 DEFLECTION OF BEAMS USING SUPERPOSITION Example Using superposition, determine the displacement at C. EI is constant. Units: lb, in. A 160 lb/in 120 B A 120 B 8000 4 29 106 53.4 psi in Ex I = = A 160 lb/in 120 B 60 8000 C

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Here in Chapter 9 we'll be learning techniques to calculate deflection in beams and shafts: C9.1 Integration Method - integrating the bending moment equation to get our slope and deflection C9.2 Discontinuity Functions (Macaulay's Method) - a general deflection equation for the whole beam that has multiple loadings Let's jump straight into it.

### Chapter 9: Deflections of Beams and Shafts

Chapter 9: Deflection of Beams Textbook: Mechanics of Materials, 7th Edition, by Ferdinand Beer, E. Johnston, John DeWolf and David Mazurek Lecture by: Dr. Atta ur Rehman Shah Website: <https://www.yourotherteacher.com>

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View Notes - 09-04 Chap Gere from E M 316 at University of Texas. 588 CHAPTER 9 Deflections of Beams Nonprismatic Beams Problem 9.7-1 The cantilever beam ACB shown in the figure has moments of

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MECHANICS OF CHAPTER 9 MATERIALS. MECHANICS OF MATERIALS. CHAPTER 9. Deflection of Beams. MECHANICS OF MATERIALS. 9- 2. Deformation of a Beam Under Transverse Loading. Relationship between bending moment and curvature for pure bending remains valid for general transverse loadings. EI.

### MECHANICS OF CHAPTER 9 MATERIALS - Civil Department

Chapter 9 Deflection of Beams Mechanics of Materials Jamal A. Abdalla American University of Sharjah • Ref.: Mechanics of Materials , Beer, Johnston, Jr. and DeWolf. Contents • 9- 2 Deformation of a Beam Under Transverse Loading Equation of the Elastic Curve Direct Determination of the Elastic Curve From the Load Di...

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Differential Equations of the Deflection Curve The beams described in the problems for Section 9.2 have constant flexural rigidity EI. Problem 9.2-1 The deflection curve for a simple beam AB (see figure) is given by the following equation: Describe the load acting on the beam. Probs. 9.2-1 and 9.2-2

### Differential Equations of the Deflection Curve

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Deflection of beams 1. Deflection of Beams <br /> Chapter 9 <br /> 2. Introduction : <br /> In this chapter we learn how to determine the deflection of beams (the maximum deflection) under given load . <br /> A prismatic beam subjected to pure Bending is bent into an arc of a circle in the elastic range ,the curvature of the neutral surface expressed as : <br />  $1/\rho = M/EI$  <br />

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Chapter 9: The Slope Deflection Method. 9.1 Introduction; 9.2 Degrees of Freedom; 9.3 The Slope-Deflection Equations; 9.4 The Slope-Deflection Method for Beams; 9.5 The Slope-Deflection Method for Non-Sway Frames; 9.6 The Slope-Deflection Method for Sway Frames; 9.7 Practice Problems;

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Chapter 10: The Moment Distribution Method. 10.1 Introduction

### **Chapter 9: The Slope Deflection Method ...**

Chapter 8. Deflections of Structures: Work-Energy Methods. 8.1 Virtual Work Method. The virtual work method, also referred to as the method of virtual force or unit-load method, uses the law of conservation of energy to obtain the deflection and slope at a point in a structure.

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As discussed in Chapter 9, Beam Deflection, there are three methods of discretization, forward, backward, and central difference methods. In each case, the values of the deflection around a specified point are used to determinate the high-order derivatives of deflection at that point.

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Using the virtual work method, determine the deflection and the slope at a point B of the cantilever beam shown in Figure 8.4a.  $E = 29 \times 10^3$  ksi,  $I = 600$  in<sup>4</sup>. Fig. 8.4. Cantilever beam. Solution. Real and virtual systems. The real and virtual systems are shown in Figure 8.4a, Figure 8.4c, and Figure 8.4e, respectively. Notice that the real system consists of the external loading carried by ...

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