控制系統
Control Systems

Unit 2D
Mechanical Systems –
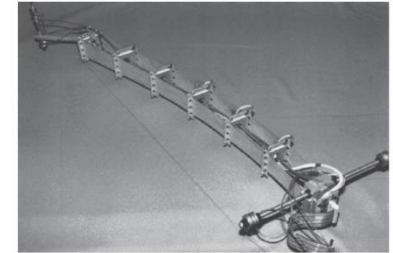## Distributed Parameter Systems
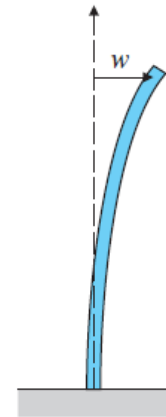
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● **Flexible beams**

- Actual structures usually bend

- The equation is a fourth-order partial differential equation

- The mass elements are continuously distributed along the beam with a small amount of flexibility between elements

- This type of system is called a distributed parameter system

▪ **Model (Equations of Motion,** [Thomson and Dahleh, 1998] **)**

$$EI\frac{\partial^4 w}{\partial x^4} + \rho\frac{\partial^2 w}{\partial x^2} = 0$$

$E = $ Young's modulus

$I = $ beam area moment of inertia

$\rho = $ beam density

$w = $ beam deflection at length x along the beam