

Fall 2021 (110-1)

控制系統
Control Systems

Unit 2D
Mechanical Systems –
Distributed Parameter Systems

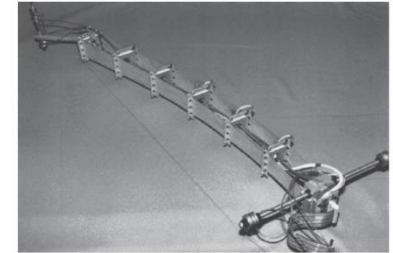
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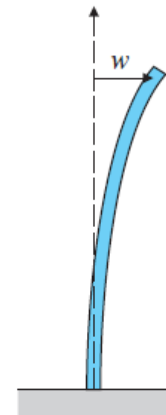
Sep 2021 – Jan 2022

● 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**



(a)



(b)

■ 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

ρ = beam density

w = beam deflection at length x along the beam