Assignment

- Implement some missing features
  - Kinematic analysis on acceleration level
    - With translational joints
  - Dynamic solution of constrained multibody systems
  - Use `ode45` (or `ode15s`) to solve equations of motion
- Analyze some not analyzed mechanism
  - Kinematics and dynamics
  - Cantilever beam model
    - Check if displacement of the model is as assumed

9.12 Deformation of the cantilever beam shown in Fig. P. 9.12(a) may be modeled by a rigid body, a revolute joint, and a rotational spring, as shown in Fig. P. 9.12(b). For a beam with

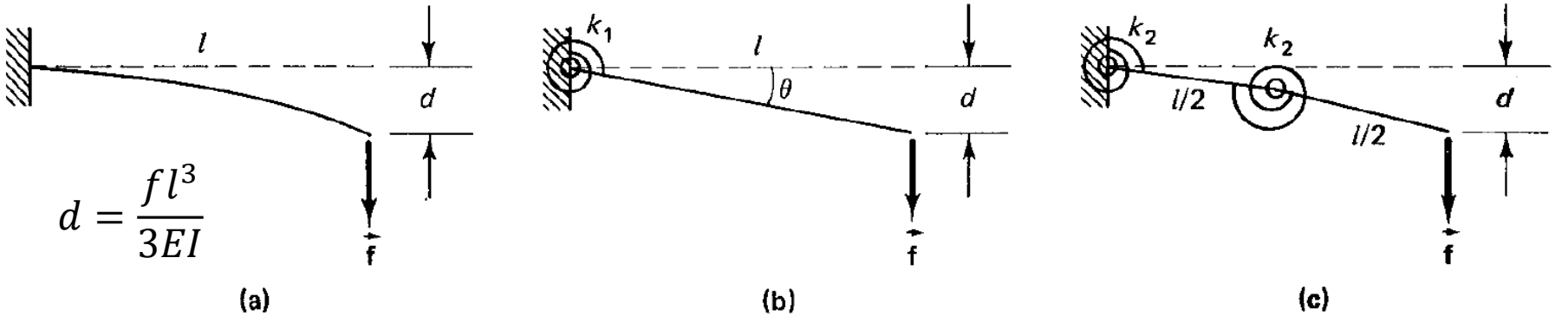

Figure P. 9.12

length l under an external load f, the free end yields a displacement d. The equivalent rigid-body model yields the same displacement if the spring stiffness k_1 is selected properly.

(a) If the beam is modeled by two rigid bodies, two revolute joints, and two rotational springs with stiffness k_2, as shown in Fig. P. 9.12(c), find an approximate formula for k_2 in terms of k_1 (for small deformations $d \ll l$).

(b) If the beam is modeled by n equal-length bodies, n revolute joints, and n rotational springs, find a formula for k_n in terms of k_1.

Assignment

- Write a brief report (up to 2 A4 pages with 12 pt font) about your solution
- Remember about proper code indent, comments, and meaningful variable and file names
- Deadline: 15.12.2021, 18:00