

Figure 1.1 A two bar mechanism.

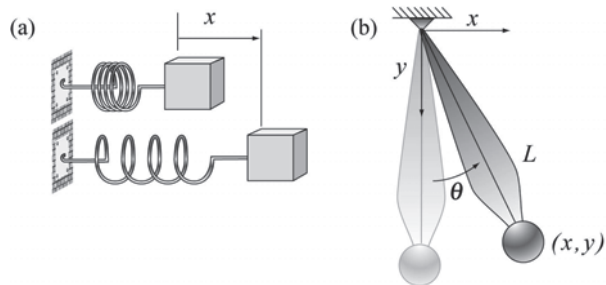


Figure 1.2 Sample single degree of freedom systems: (a) mass-spring system, (b) simple pendulum.

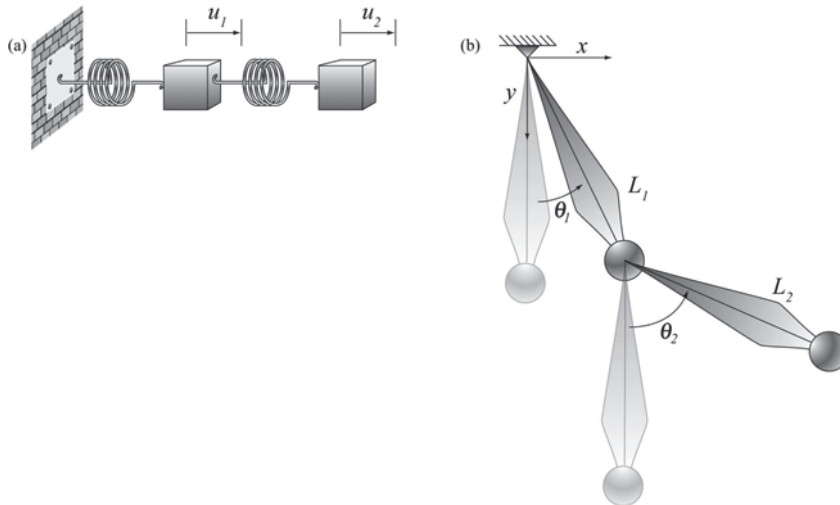


Figure 1.3 Sample two degree of freedom systems: (a) two-mass two-spring system, (b) double pendulum.

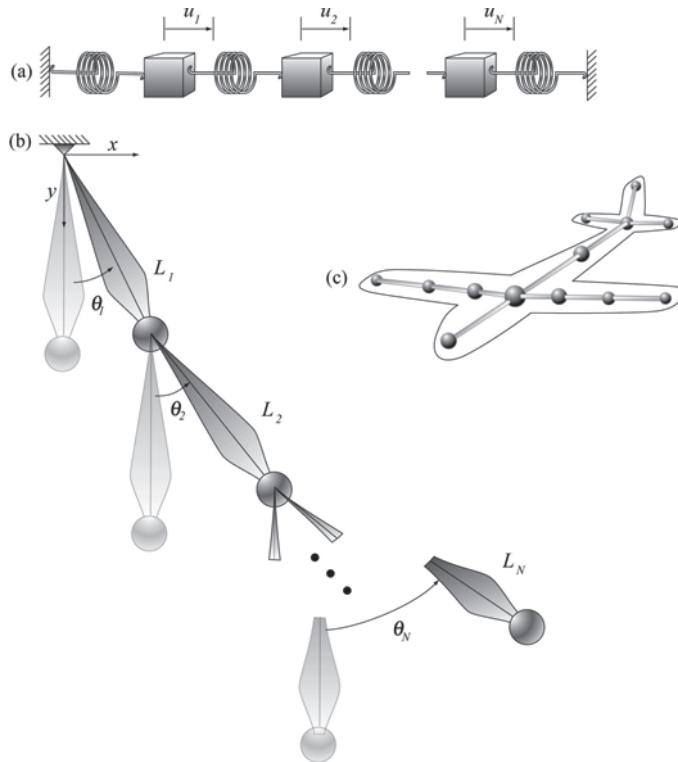


Figure 1.4 Sample  $N$ -degree of freedom systems: (a)  $N$ -mass  $N+1$ -spring system, (b) compound pendulum, (c) discrete model of aircraft structure.

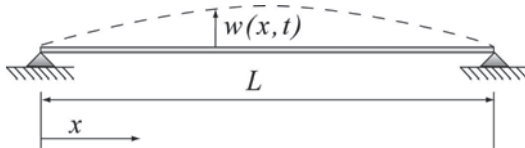


Figure 1.5 Elastic beam: an example of a continuous system.

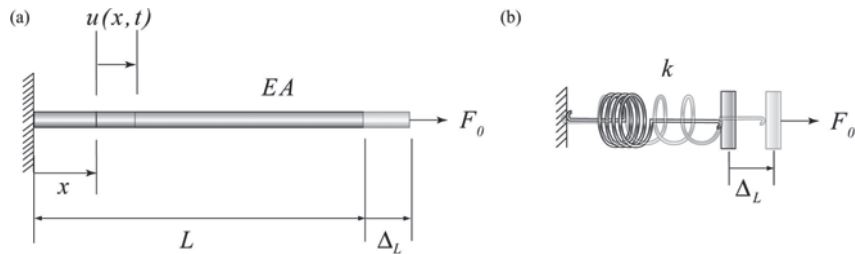


Figure 1.6 (a) Elastic rod subjected to axial load, (b) equivalent single degree of freedom system.

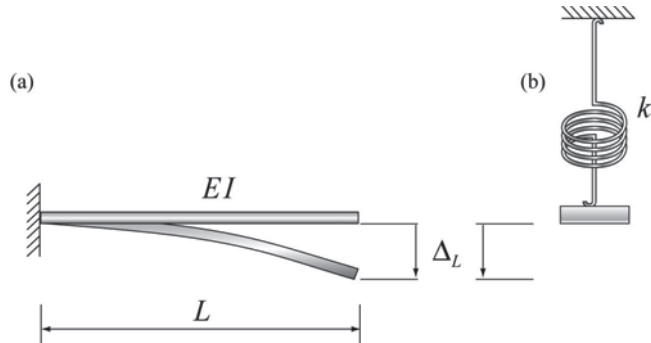


Figure 1.7 (a) Cantilever beam, (b) equivalent single degree of freedom system.

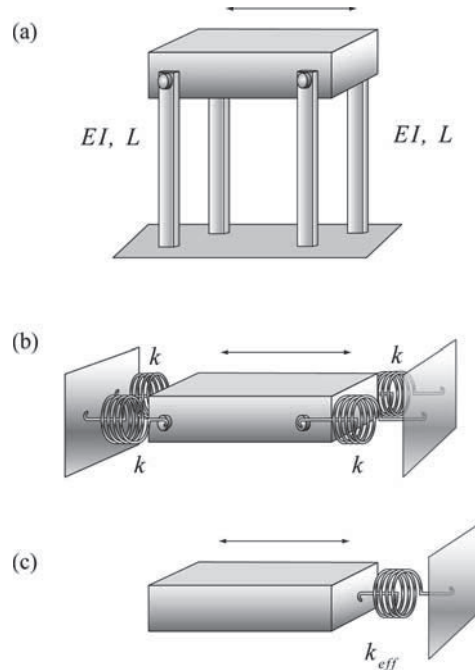


Figure 1.8 Side-sway of one-story structure with pinned connections at roof: (a) representative structure, (b) roof with columns represented as equivalent springs, (c) equivalent system.



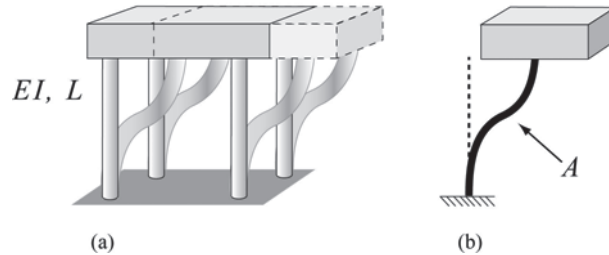


Figure 1.9 Side-sway of one-story structure with clamped connections at roof: (a) structure in motion, (b) deflection of column showing inflection point A.

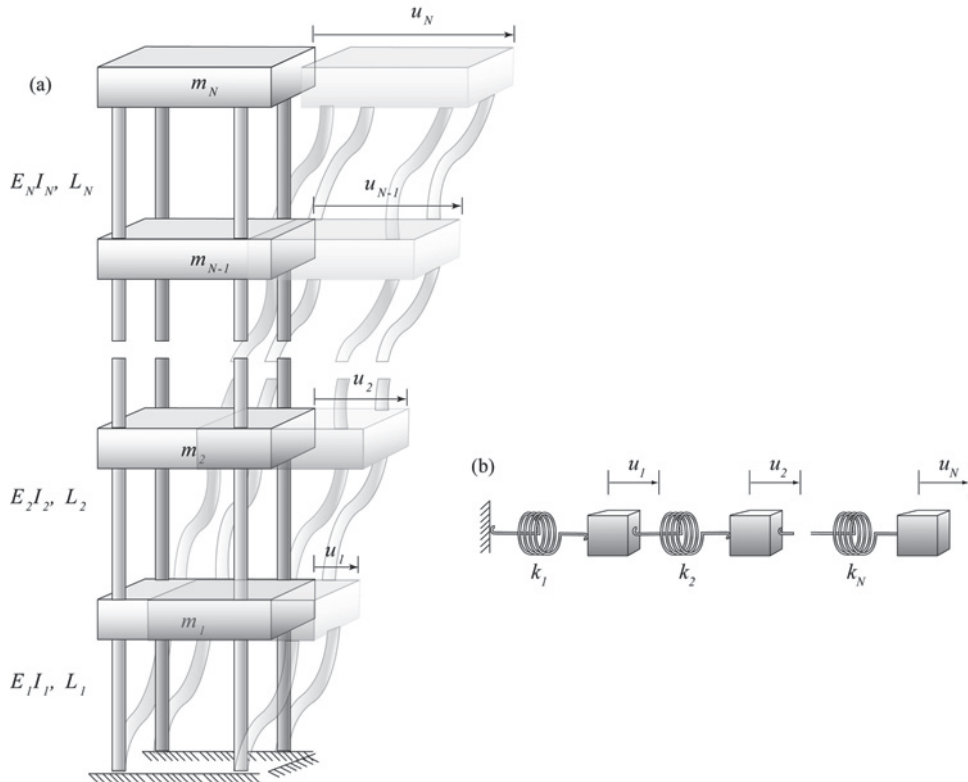


Figure 1.10 Side-sway of multi-story structure: (a) multi-story building, (b) equivalent discrete system.

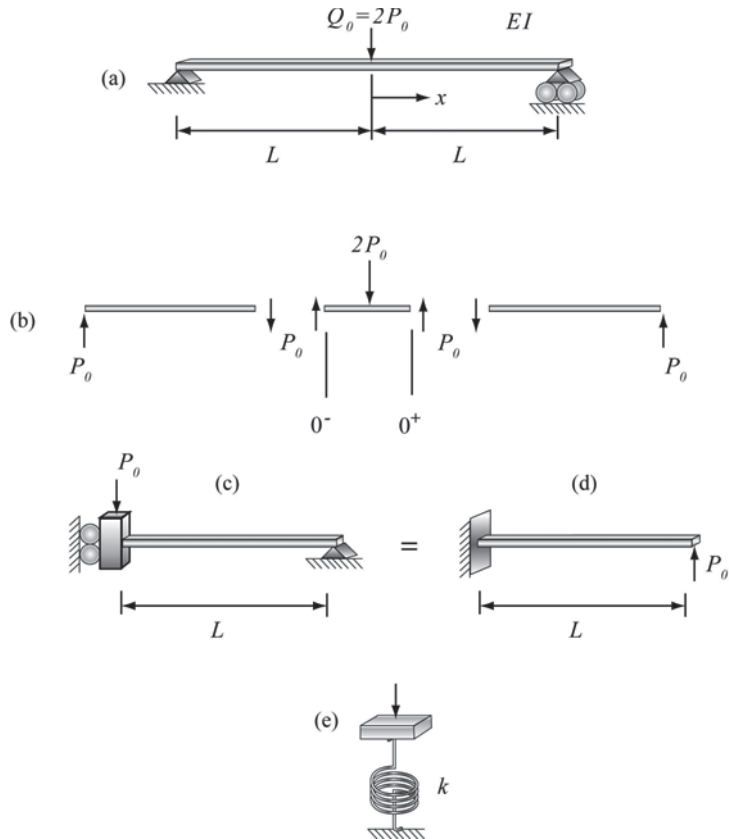


Figure 1.11 Simply supported beam: (a) beam subjected to point load at center of span, (b) freebody diagram of segmented beam, (c) half span problem, (d) equivalent cantilever beam, (e) equivalent single degree of freedom system.

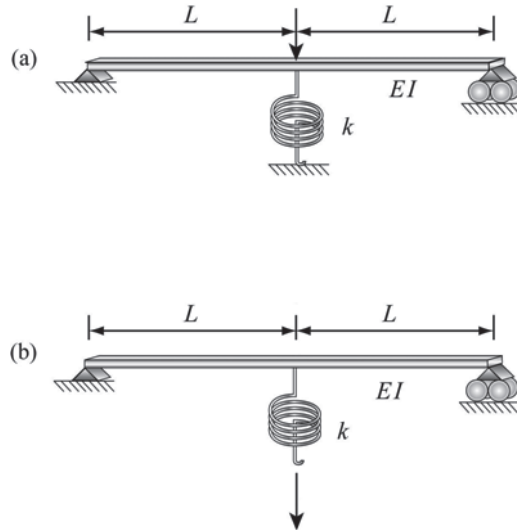


Figure 1.12 Compound system of elastic beam and spring: (a) fixed spring, (b) loaded spring.

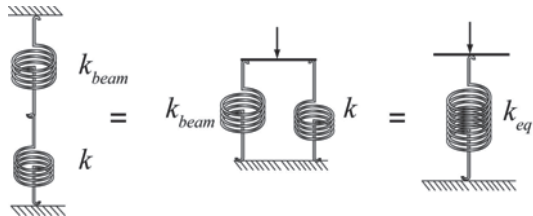


Figure 1.13 Equivalent system for beam and spring of Figure 1.12a.

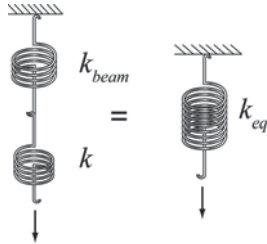


Figure 1.14 Equivalent system for beam and spring of Figure 1.12b.

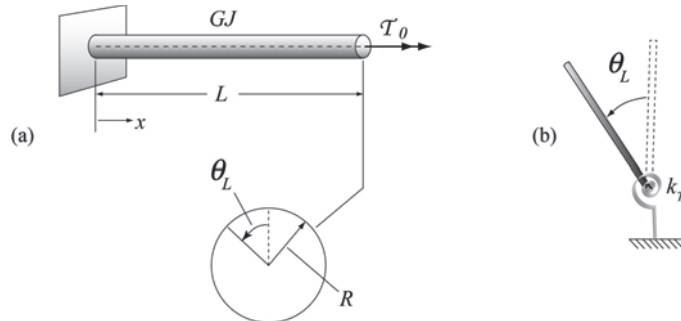


Figure 1.15 Torsion of elastic rod: (a) elastic rod, (b) equivalent 1 d.o.f. system.

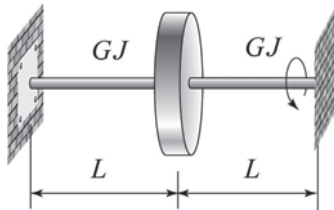


Figure 1.16 Rigid disk at junction of two elastic rods.



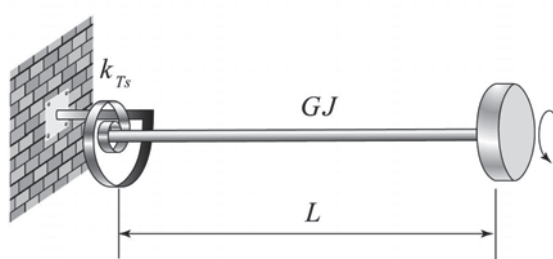


Figure 1.17 Elastic rod with compliant support.

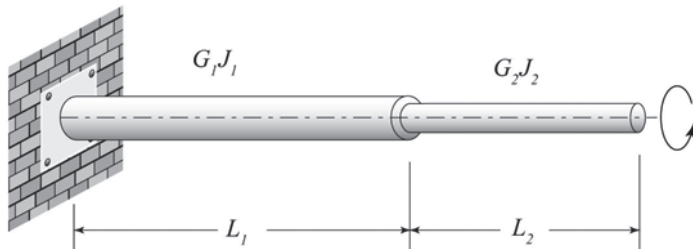


Figure 1.18 Elastic rods in series.

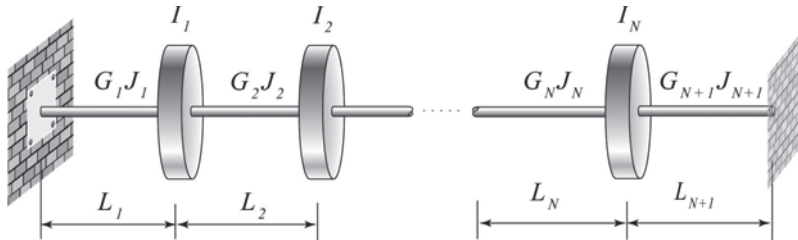


Figure 1.19 Multi-component shaft.

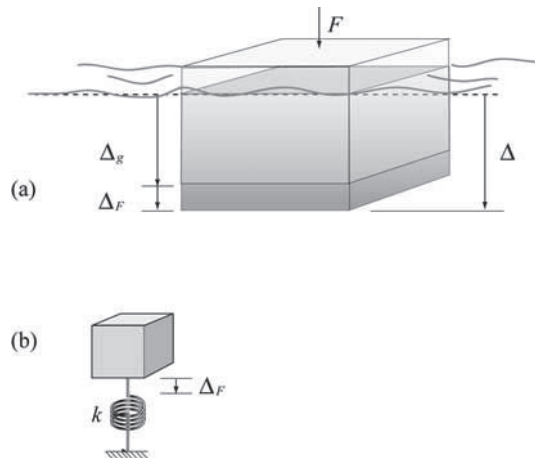


Figure 1.20 (a) Floating body, (b) equivalent system.

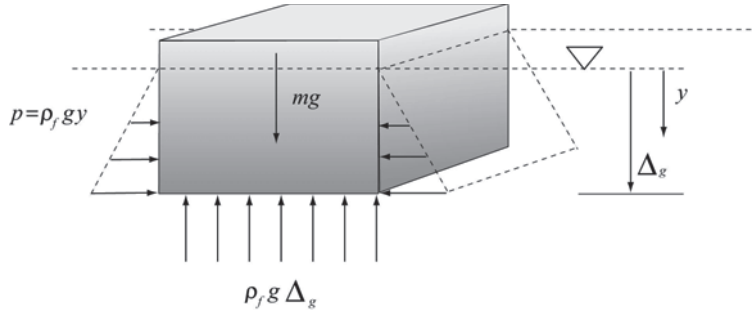


Figure 1.21 Free-body diagram of floating body under its own weight.

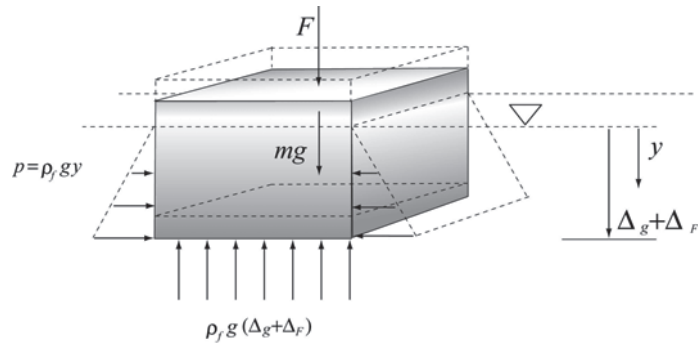


Figure 1.22 Free-body diagram of floating body subjected to an applied force.

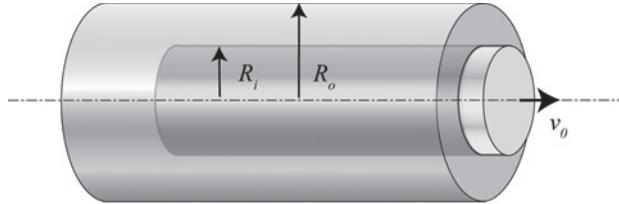


Figure 1.23 Rod moving through viscous fluid contained within cylinder.

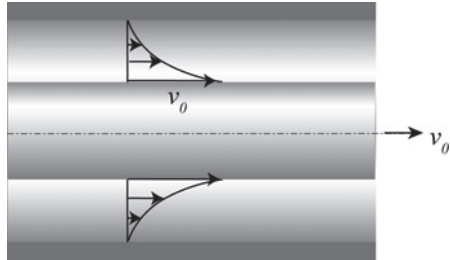


Figure 1.24 Flow field of damper fluid.



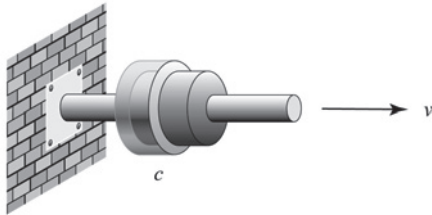


Figure 1.25 Representation of viscous damper.

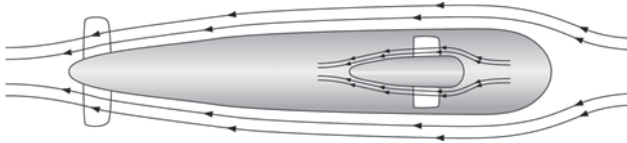


Figure 1.26 Body moving through fluid medium.

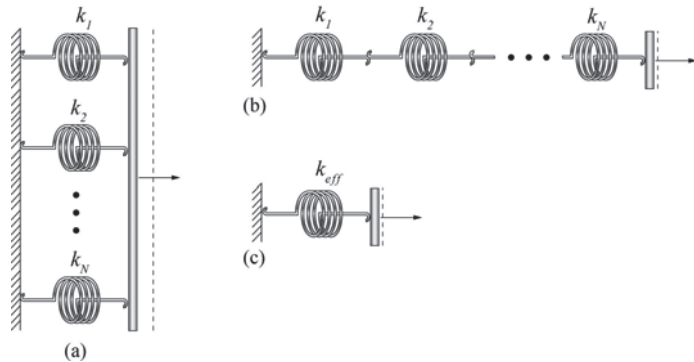


Figure 1.27 Compound springs: (a) springs in parallel, (b) springs in series, (c) equivalent system.

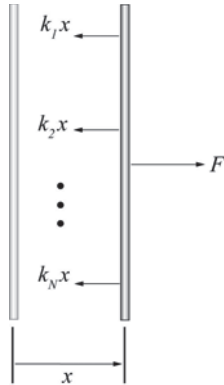


Figure 1.28 Free-body diagram for springs in parallel.



Figure 1.29 Free-body diagram for springs in series.

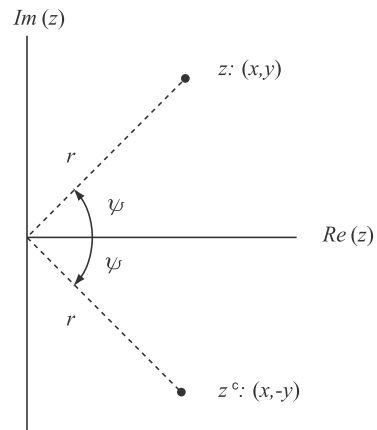


Figure 1.30 Graphical representation of a complex number and its conjugate

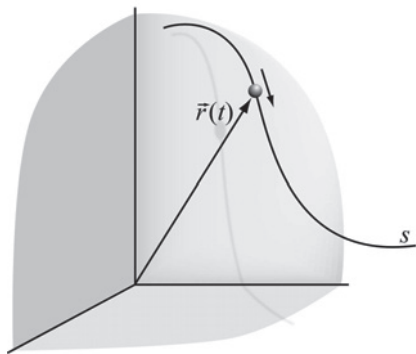


Figure 1.31 A particle and its trajectory.

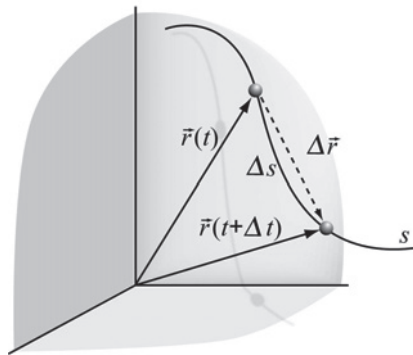


Figure 1.32 Displacement of a particle.



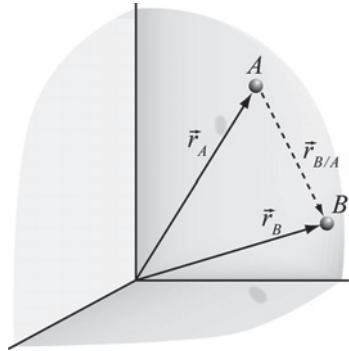


Figure 1.33 Two particles in motion.

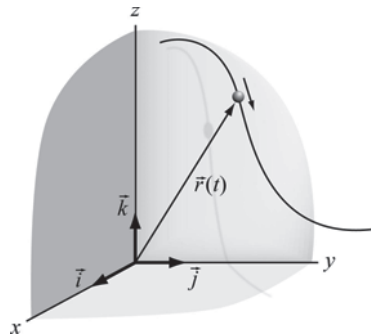


Figure 1.34 Cartesian coordinates.

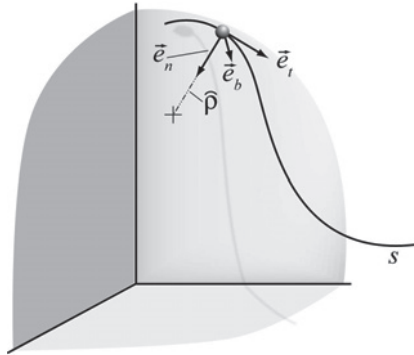


Figure 1.35 Path coordinates.

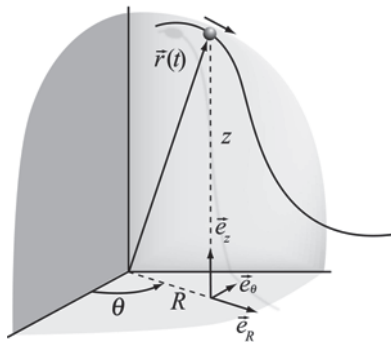


Figure 1.36 Cylindrical-polar coordinates.

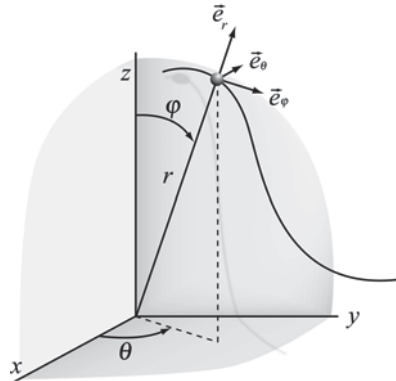


Figure 1.37 Spherical coordinates.

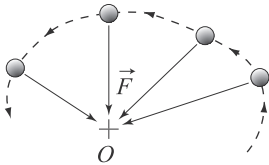


Figure 1.38 Central force motion.

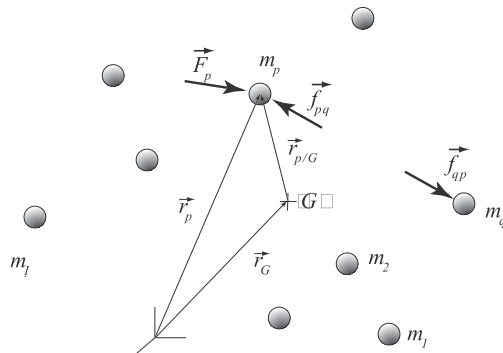


Figure 1.39 System of  $N$  particles.

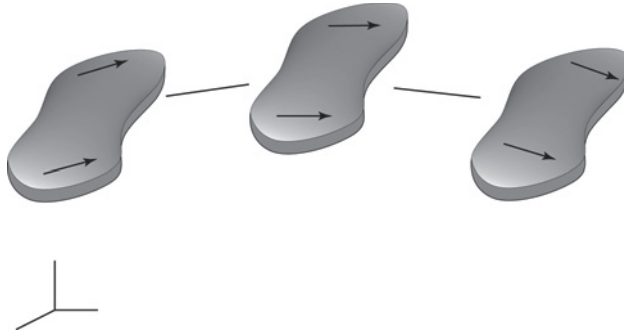


Figure 1.40 Rigid body in pure translation.



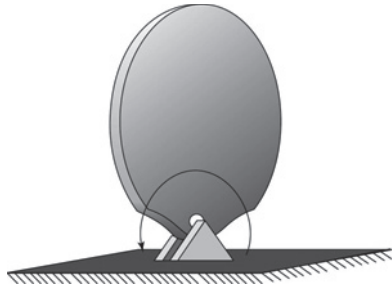


Figure 1.41 Motion of a rigid body with one point fixed: pure rotation.

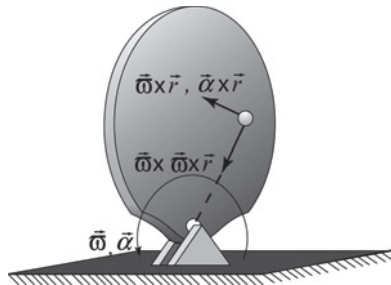


Figure 1.42 Velocity and acceleration of generic point of a rigid body in pure rotation.

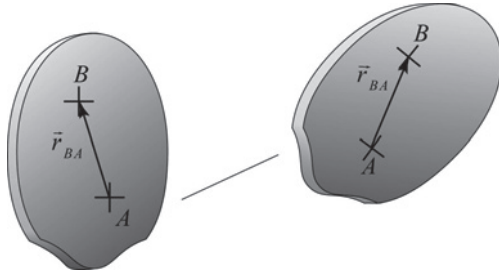


Figure 1.43 General motion of a rigid body.

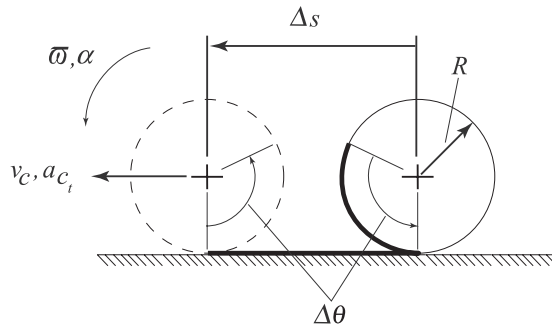


Figure 1.44 Wheel rolling without slip.

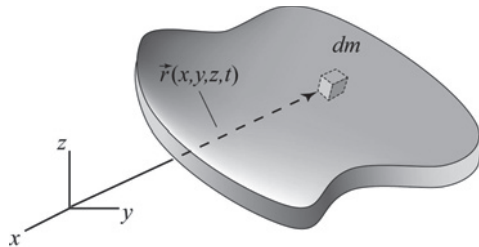


Figure 1.45 Rigid body, showing generic mass element.

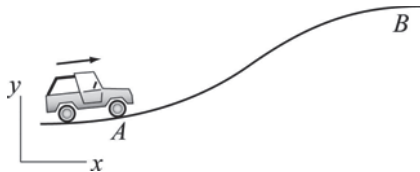


Figure E1.1a

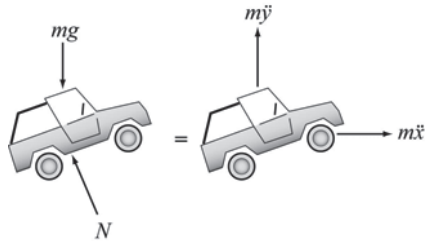


Figure E1.1b Kinetic diagram for vehicle.

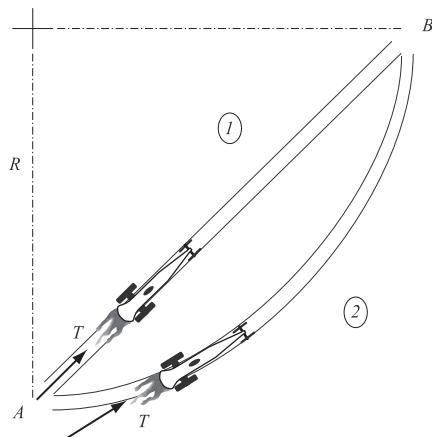


Figure E1.2 Rocket car traversing two different tracks.



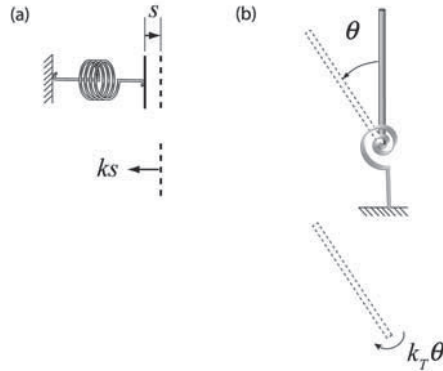


Figure E1.3 Displacement and restoring action: (a) linear spring, (b) torsional spring.

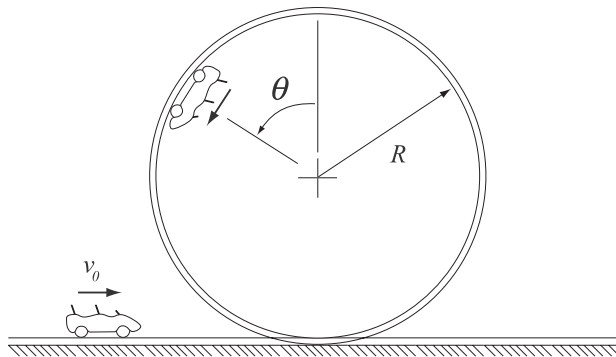


Figure E1.4a Roller coaster and loop.

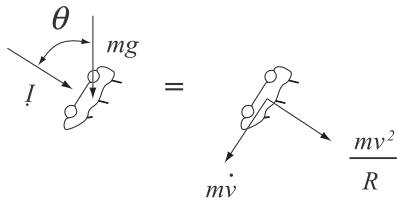


Figure E1.4b Kinetic diagram for coaster.

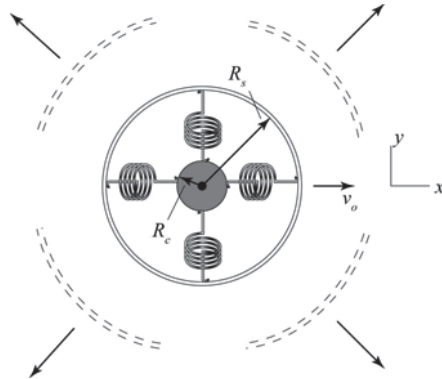


Figure E1.5 Fragmented disk.

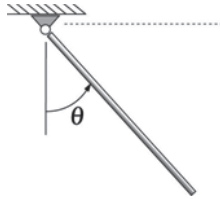


Figure E1.6a

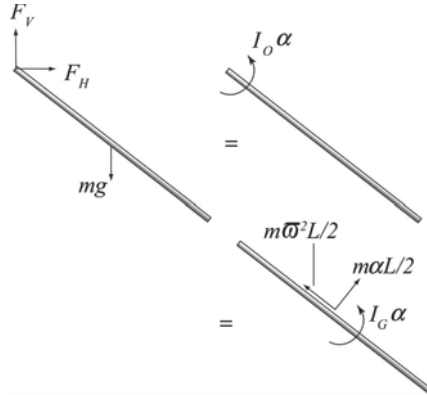


Figure E1.6b Kinetic diagram for swinging rod.



Figure P1.1

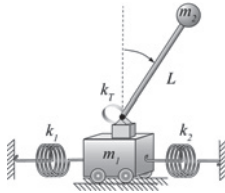


Figure P1.2



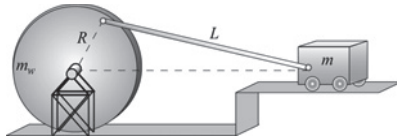


Figure P1.3

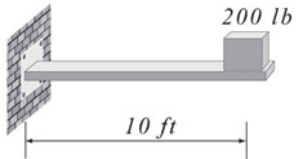


Figure P1.4

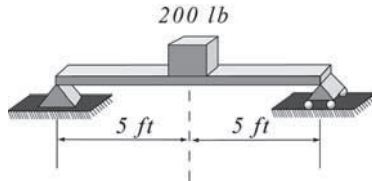


Figure P1.5

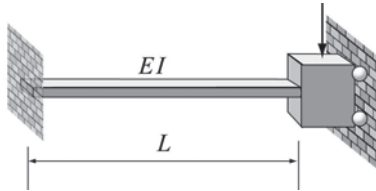


Figure P1.6



Figure P1.7

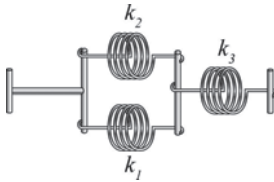


Figure P1.8

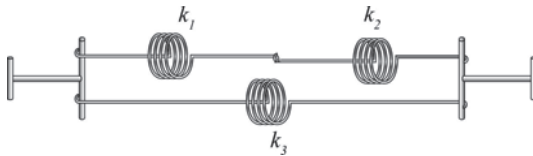


Figure P1.9

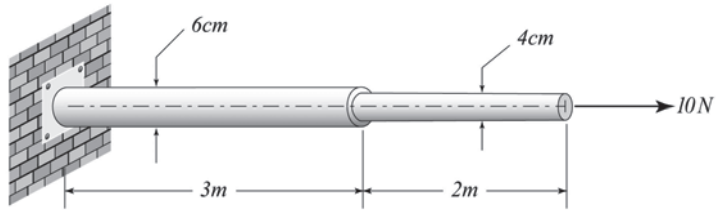


Figure P1.10



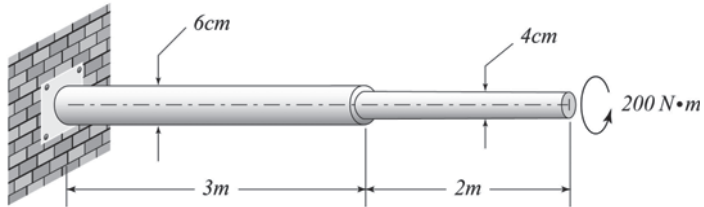


Figure P1.11

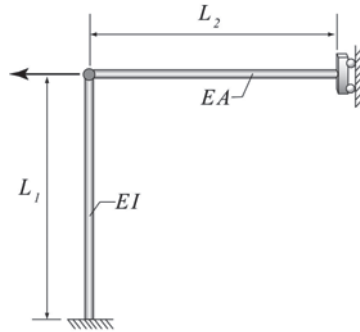


Figure P1.12

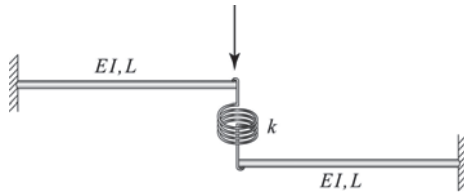


Figure P1.13

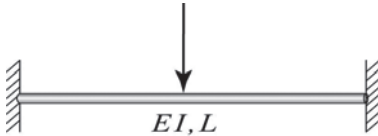


Figure P1.14

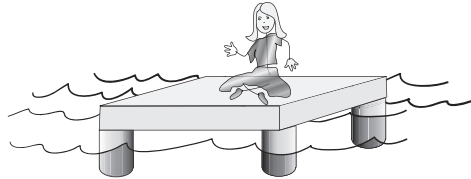


Figure P1.15

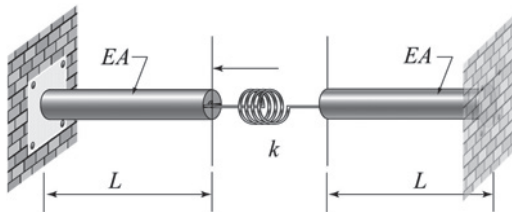


Figure P1.16

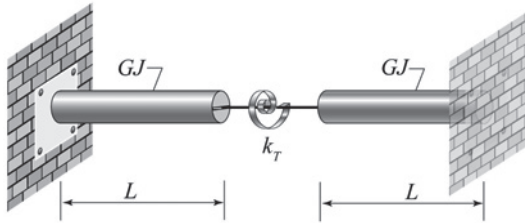


Figure P1.17

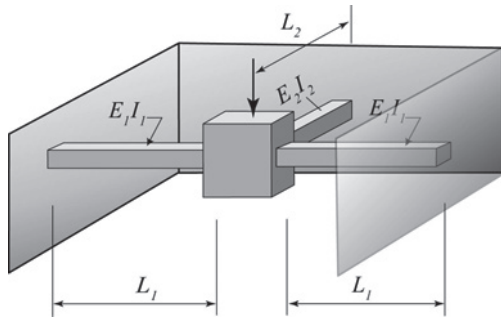


Figure P1.18



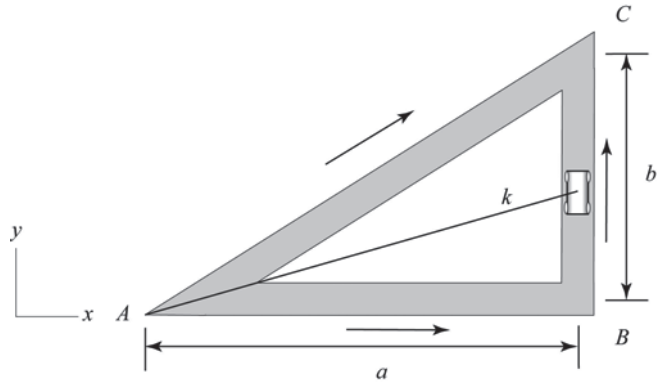


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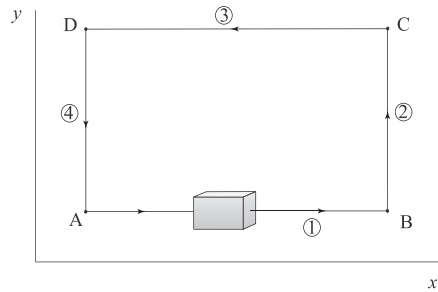


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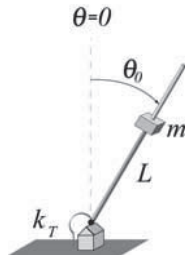


Figure P1.25

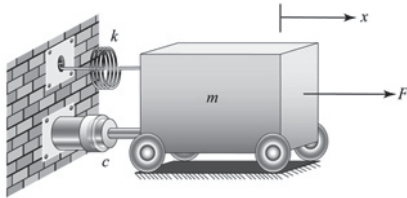


Figure P1.26

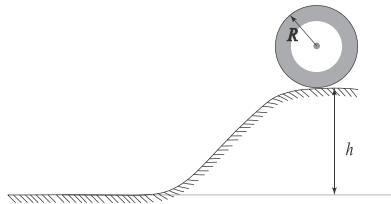


Figure P1.27