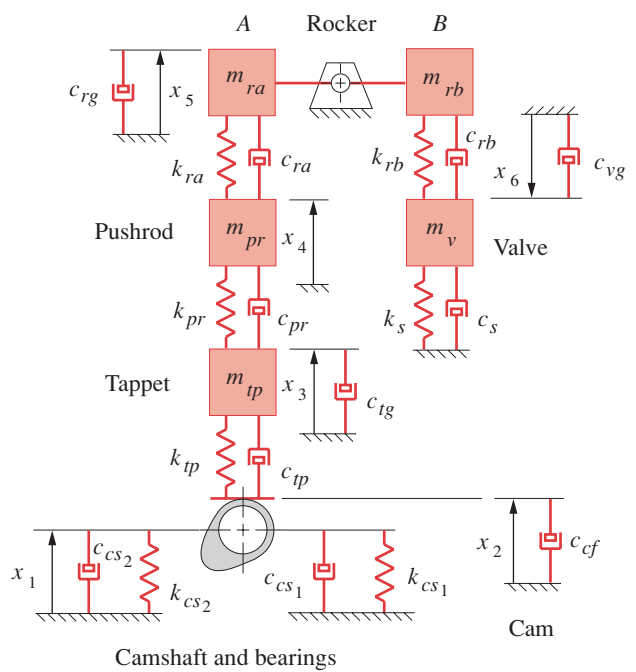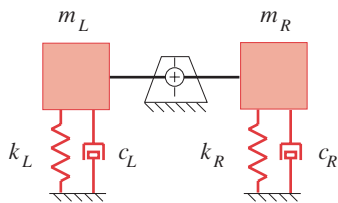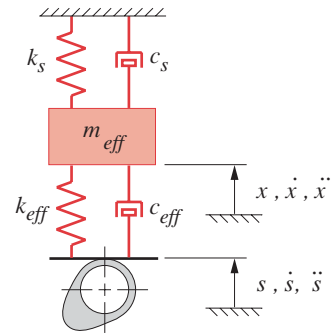*A*   Rocker   *B*

(*b*) Six-*DOF* model

(*a*) Physical model

(*c*) One-*DOF* model with lever arm

(*d*) One-*DOF* lumped model

[†]10-15   Refer to Figure 10-11 (p. 547) and Example 10-1 (p. 546). The dimensions for the valve train are, (in ips unit system):

Tappet is a solid cylinder 0.75 diameter by 1.25 long
Pushrod is a hollow tube. 0.375 outside diameter by 0.25 inside diameter by 12 long.
Rocker arm has an average cross section of 1 wide by 1.5 high
Length $a = 2$, $b = 3$.
Camshaft is 1 diameter by 3 between bearing supports, cam in center.
Valve spring $k = 200$
All parts are steel

Calculate the effective spring constant and effective mass of a single-DOF equivalent system placed on the cam side of the rocker arm.