

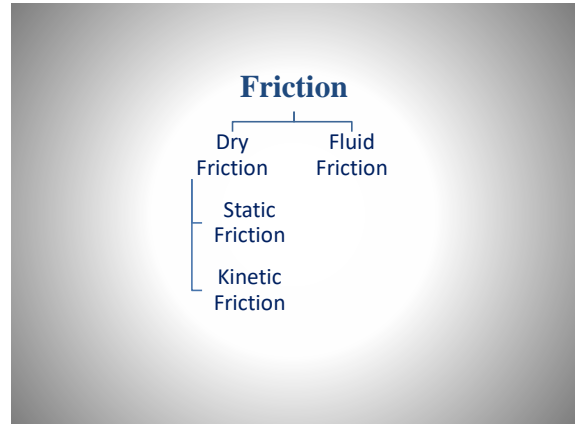
ME 141

Engineering Mechanics

Portion 5

Friction Fundamental

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Friction: Static and Kinetic Friction

No Friction

Friction due to driving force P

F_m is maximum static force impending the motion

Laws of Friction:

$F_m = \mu_s N$

$F_k = \mu_k N$

NOTE:

- Friction force F increases with increase in driving force P and reaches to a maximum value F_m .
- F_k depends upon **ONLY** normal force and can not increase or decrease with change in driving force P .

Problem 5.1 (Beer Johnston, 10th edition, P8.1 and P8.2)

Determine whether the block shown is in equilibrium and find the magnitude and direction of the friction force when $\theta = 25^\circ$ and

(a) $P = 750$ N
 (b) $P = 150$ N

Problem 5.2 (Beer Johnston, 10th edition, P8.13)

The coefficients of friction are $\mu_s = 0.40$ and $\mu_k = 0.30$ between all surfaces of contact. Determine the smallest force P required to start the 30-kg block moving if

(a) cable AB is attached as shown
 (b) Cable AB is removed.

ANS. (a) P = 353 N ←
(b) P = 196.2 N ←

End of Portion 5

References

➤ **Vector Mechanics for Engineers: Statics and Dynamics**
Ferdinand Beer, Jr., E. Russell Johnston, David Mazurek, Phillip Cornwell.