Course Code: ESC106A
Course Title: Construction Materials and Engineering Mechanics

Lecture No. 49:
Problems on Ladder Friction

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Lecture Intended Learning Outcomes

At the end of this lecture, students will be able to:

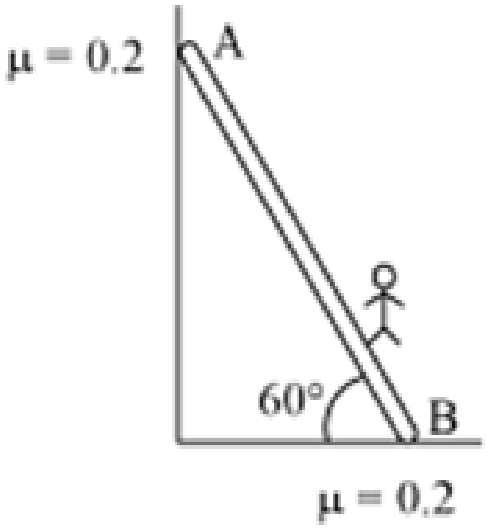
- Describe the concepts of ladder friction
- Draw Free Body diagrams of Ladder in the given problems
- Evaluate frictional forces or find the height upto which a person can ascend safely or find the force needed to be applied at the floor level to hold the ladder in equilibrium

Contents

- Numerical problems on Ladder friction

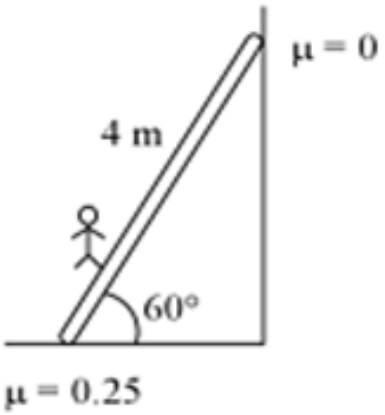
Ladder Friction: Problem 1

A 4m long ladder weighing 200N rests on a floor and against a wall. The ladder makes a 60˚ angle with the ground. For all the contact surfaces the coefficient of friction is 0.2.A man weighing 500N moves up the ladder. Find the distance he covers when the ladder slips.



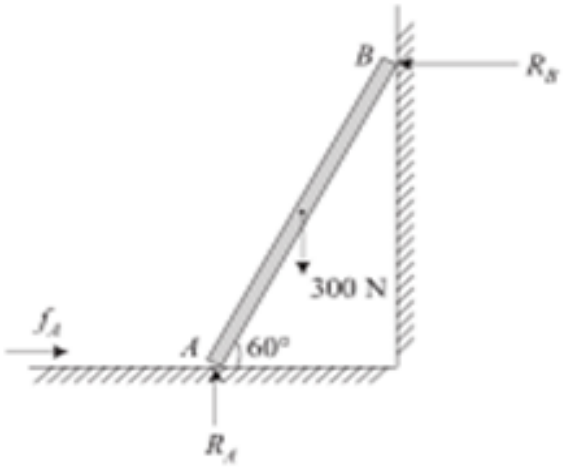
Ladder Friction: Problem 2

A 4m long ladder having mass 15kg rests on a rough floor and a smooth wall. The ladder makes a 60˚ angle with the ground. The coefficient of friction is between the ladder and the ground is 0.25.A man weighing 500N moves up the ladder. Find the distance he covers when the ladder slips.



Ladder Friction: Problem 3

A uniform ladder of weight 300N rests against a smooth vertical wall a rough horizontal floor making an angle 60˚ with the horizontal. Find the force of friction at floor.



Summary

- Friction is the force resisting the relative motion of solid surfaces, fluid layers and material elements sliding against each other
- Based on the concept of ladder friction the problems are solved