

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



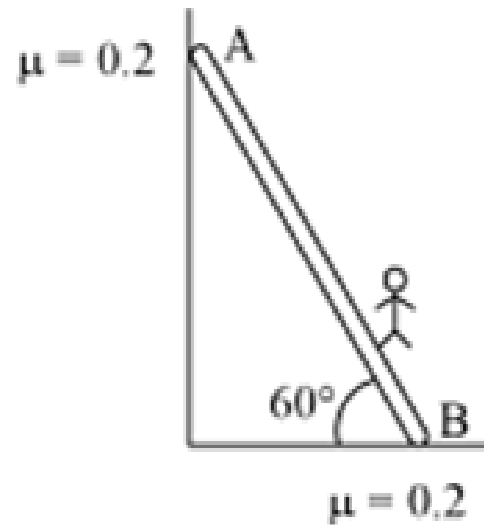
Contents

- Numerical problems on Ladder friction



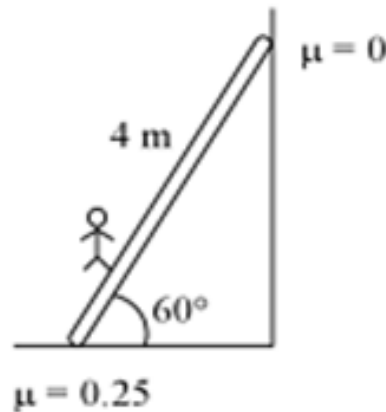
Ladder Friction: Problem 1

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.



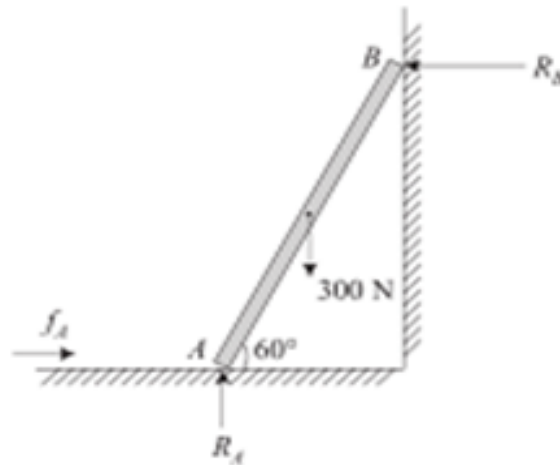
Ladder Friction: Problem 2

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 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

