Advanced Dynamics
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Module No # 06
Lecture No # 27
Planar Kinetics of Rigid Bodies – I

In this lecture I am going to discuss about planar kinetics of rigid bodies and we are going to look at problems.

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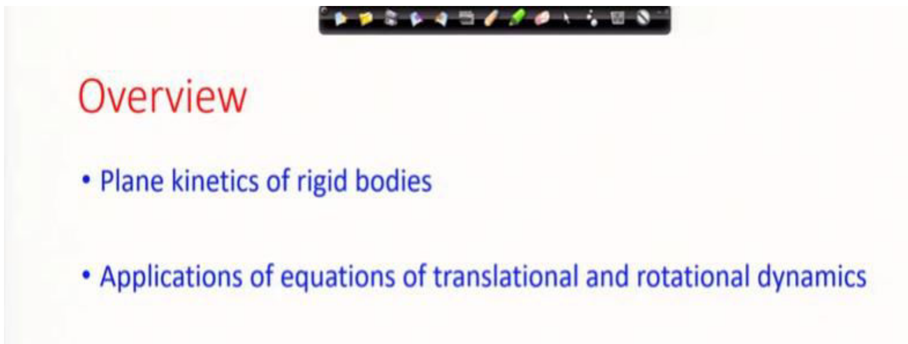

I will show you through these problems some applications of these equations of translational and rotational dynamics.

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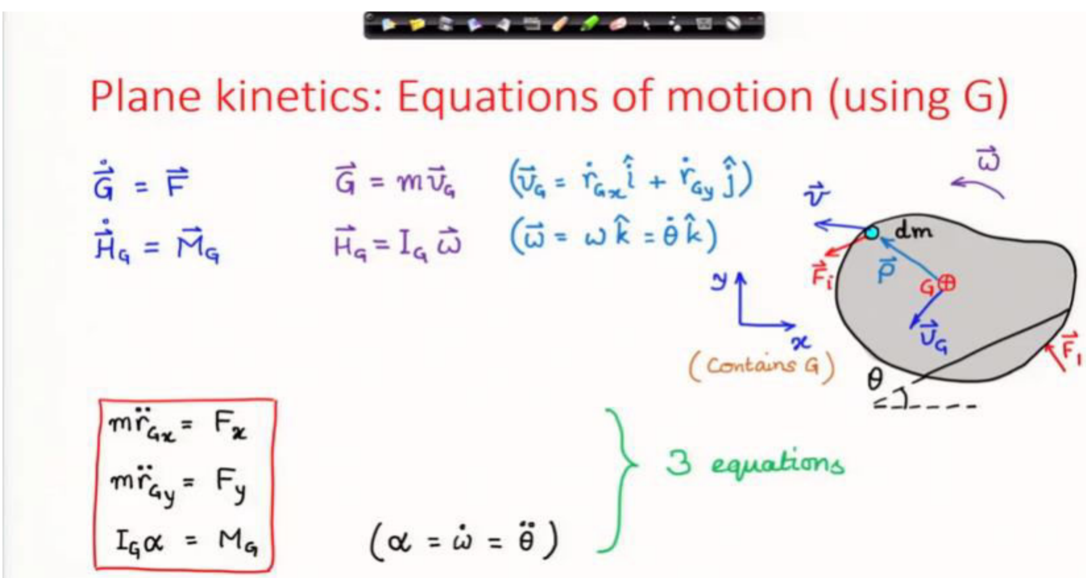

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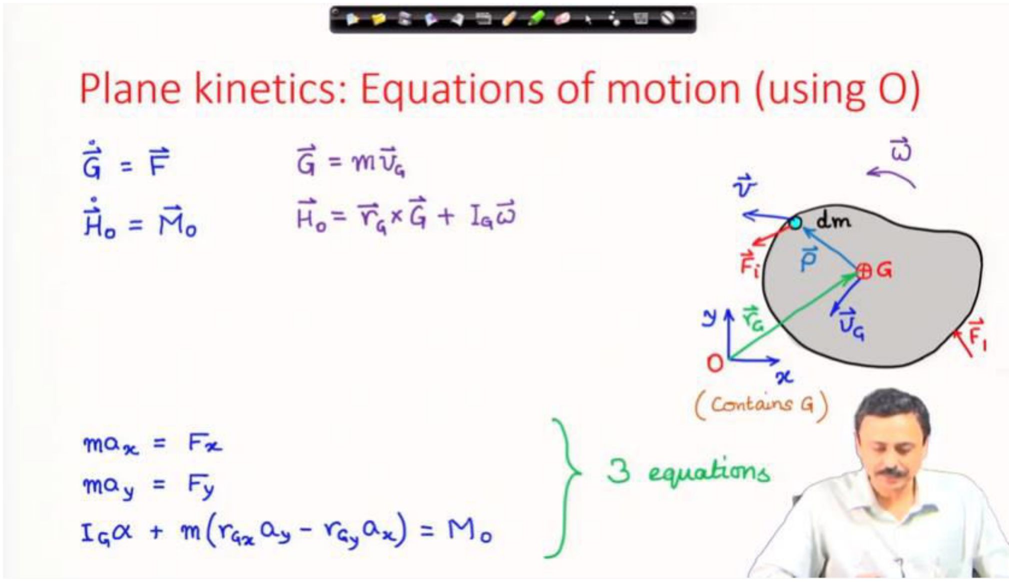

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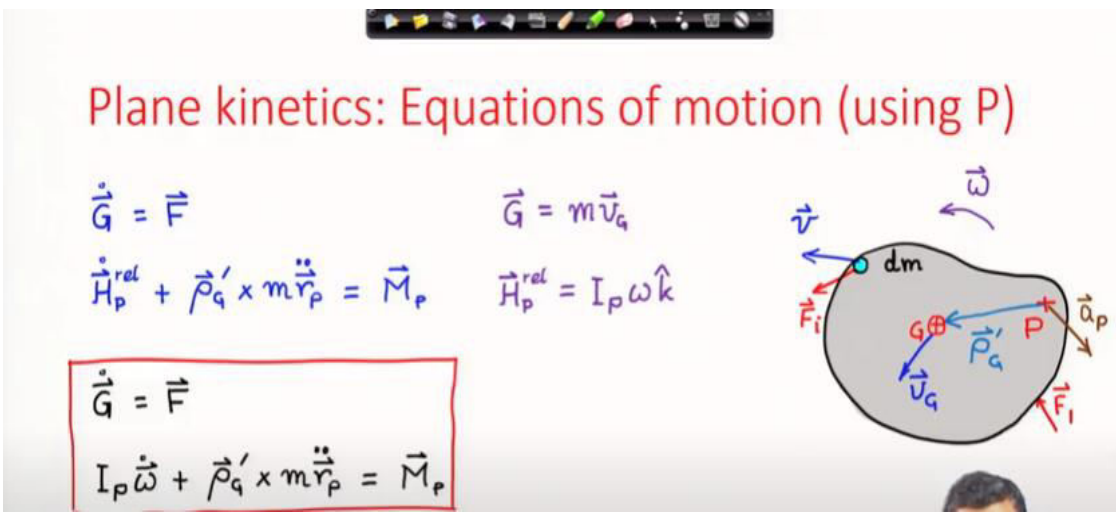

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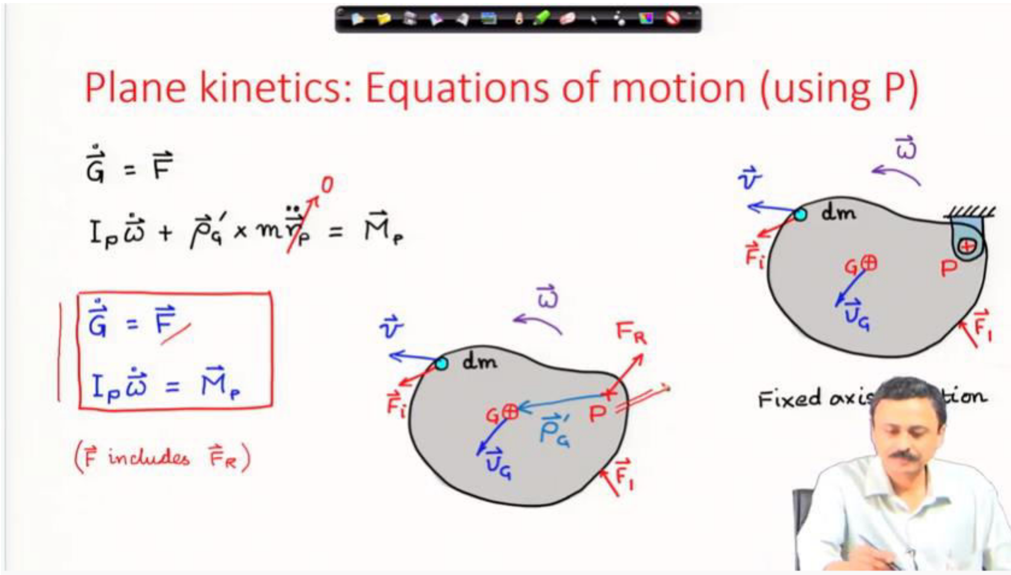

The 4 slides above recapitulate the discussions on planar kinetics of prismatic bodies (lamina).

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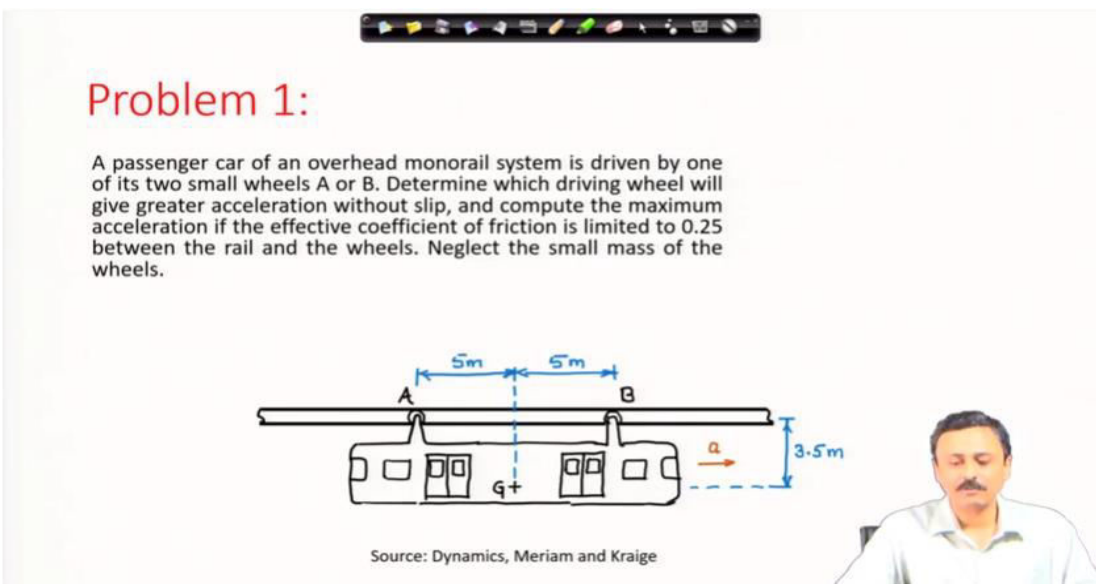

The problem statement is shown in the slide above.

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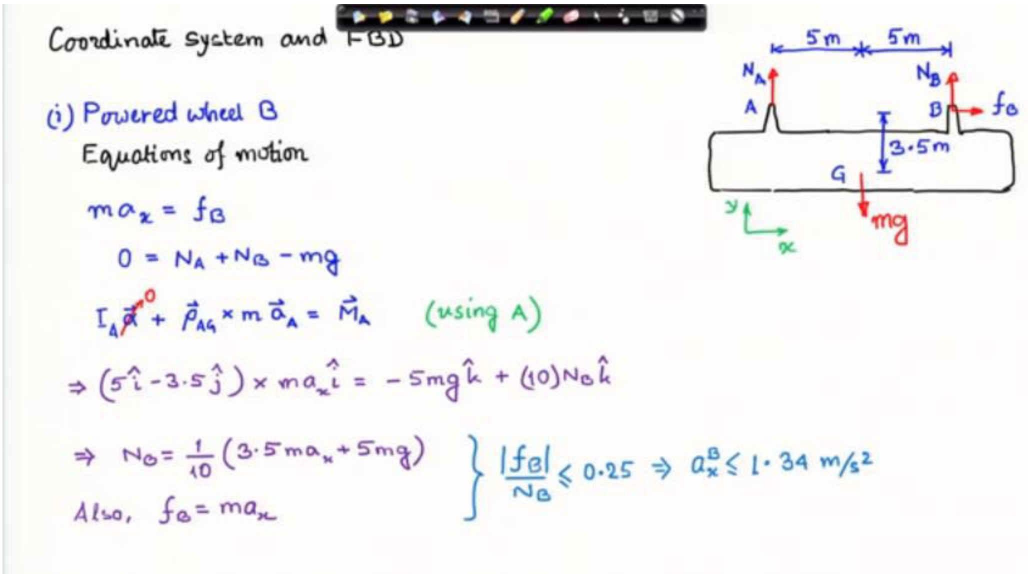

The coordinate system and the free body diagram are shown in the slide above. To begin with, we consider that wheel B is powered. Then the calculation to determine the maximum acceleration is presented.

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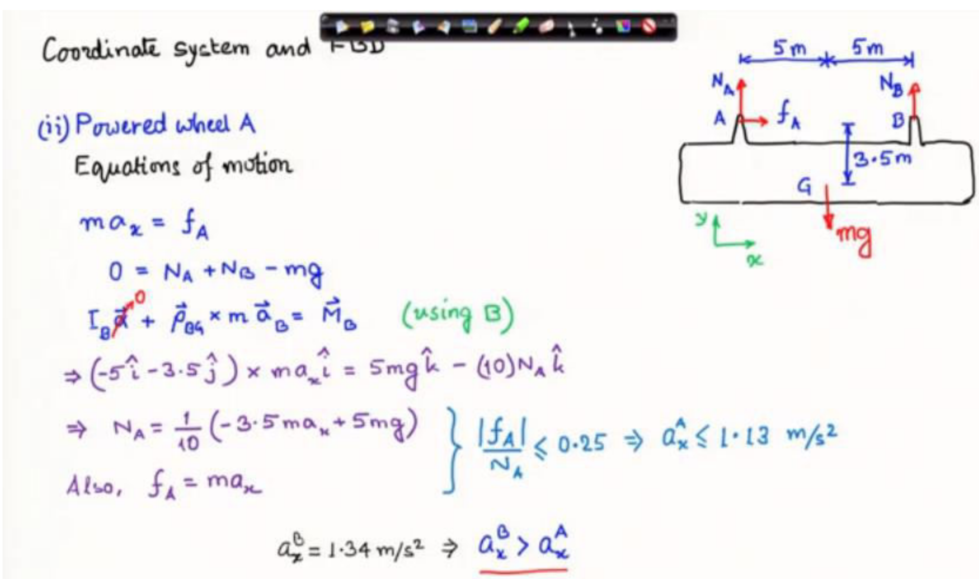

The calculation of maximum acceleration when wheel A is powered is shown above. It is found that we can achieve higher acceleration when wheel B is powered.

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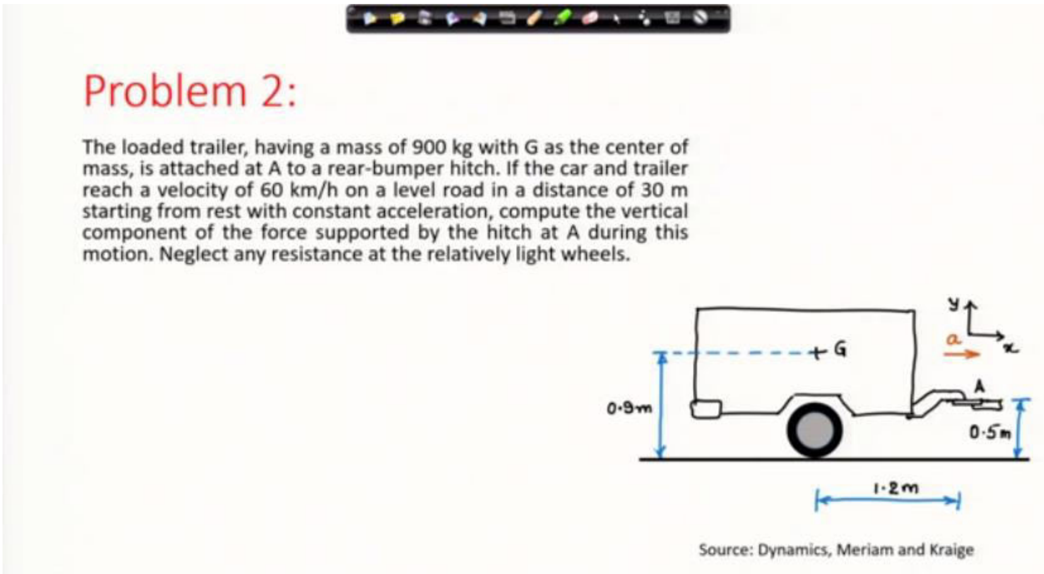

The statement of the next problem is shown in the slide above.

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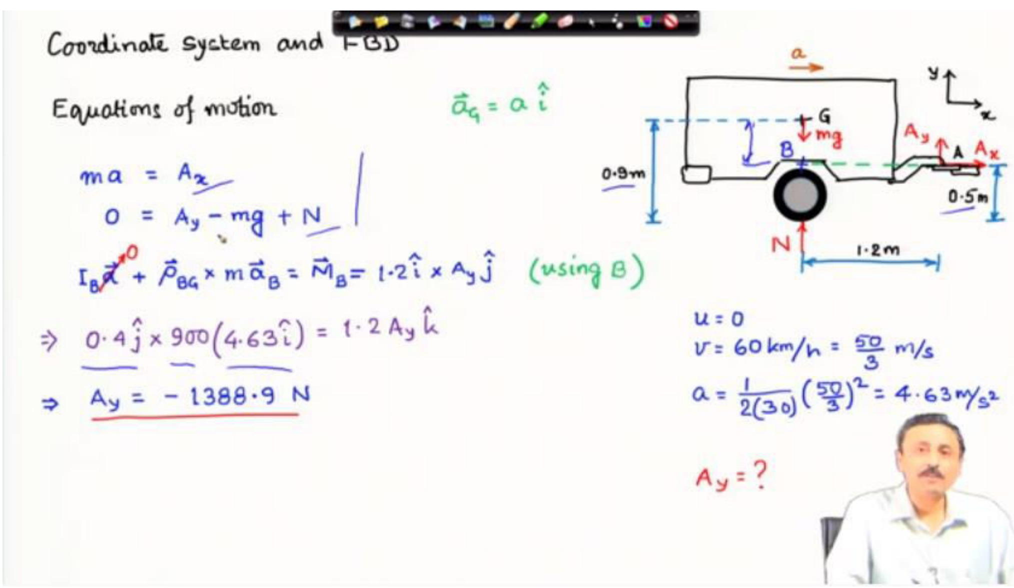

The detailed solution is presented in the slide above.

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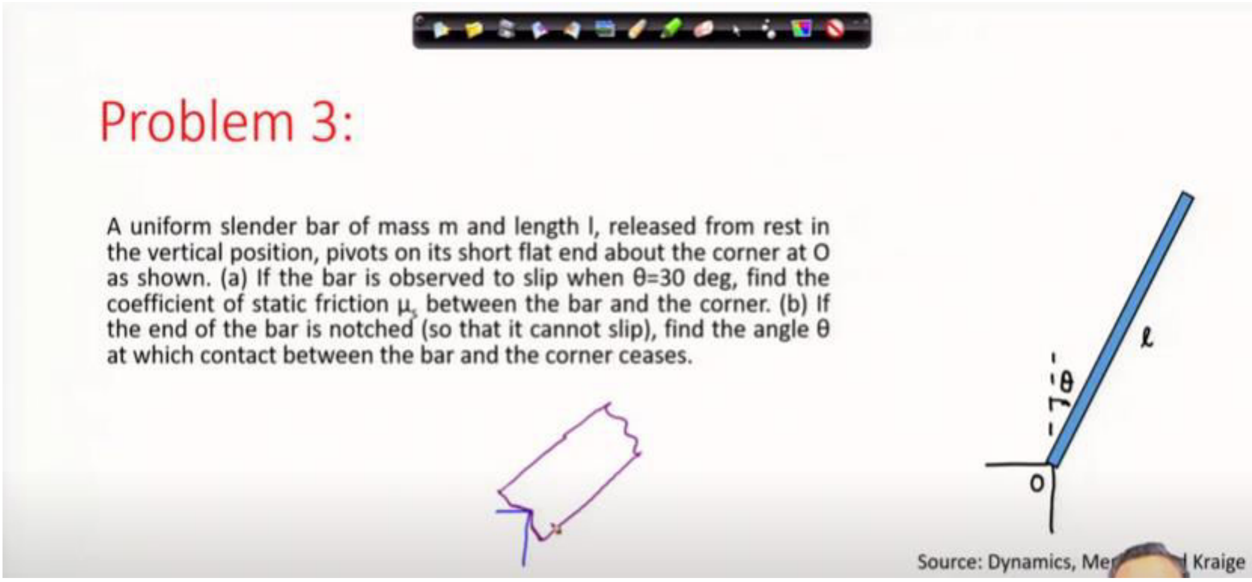

The next problem statement is shown above.

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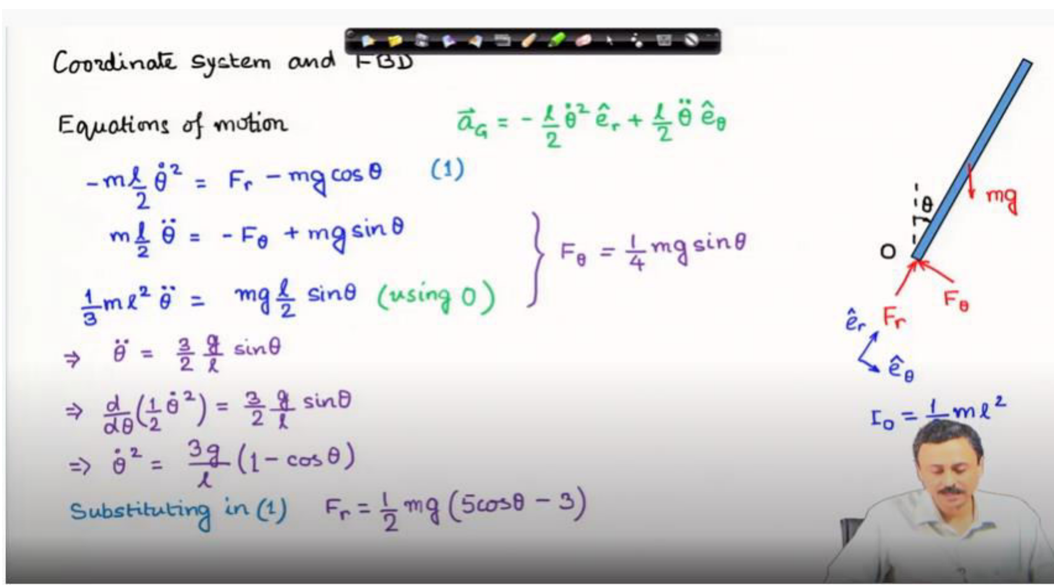

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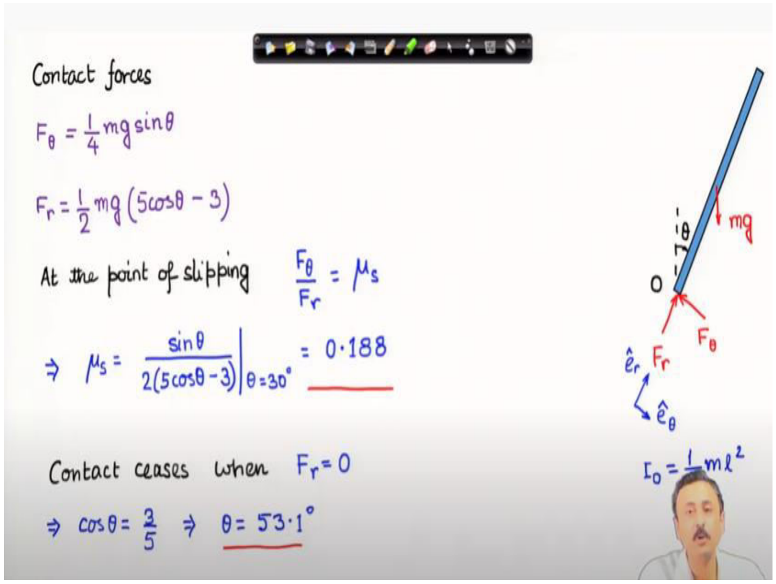

The 2 slides above present the detailed solution.

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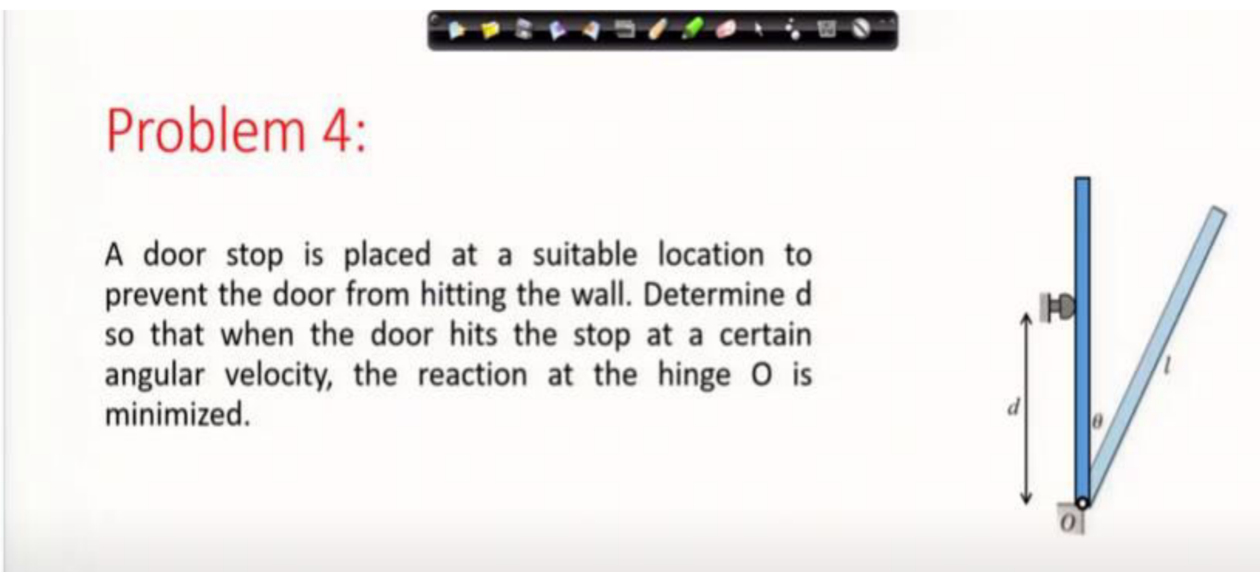

A problem related to the positioning of a door stop is shown in the slide above.

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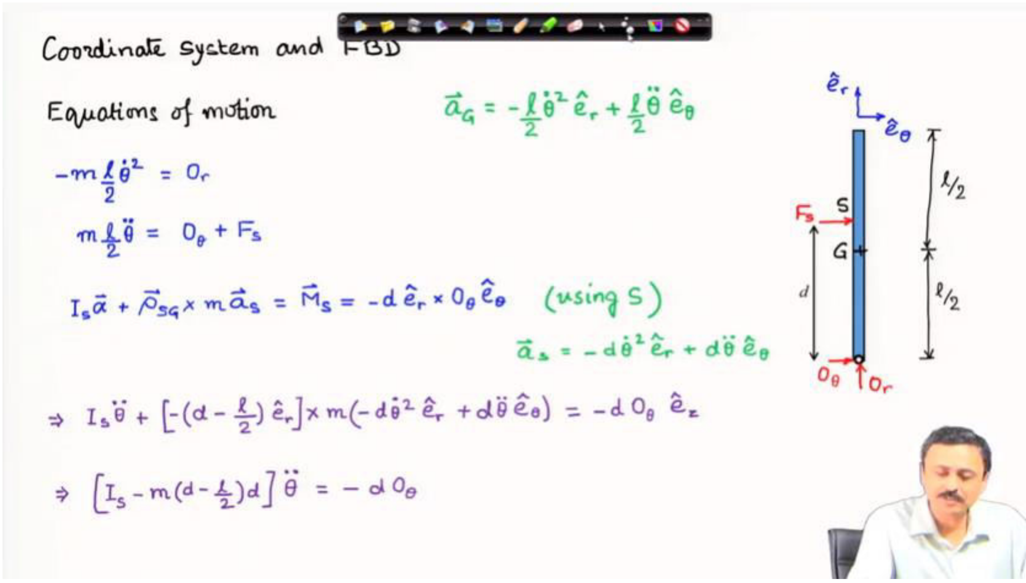

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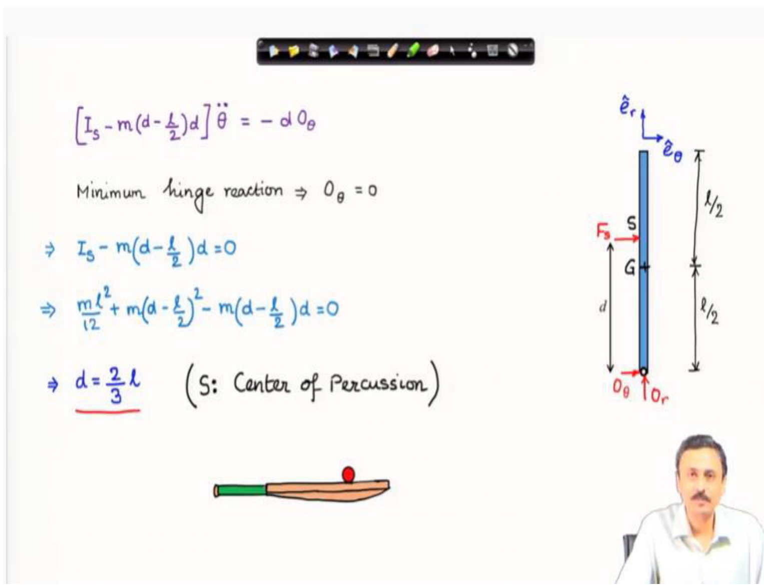

The detailed solution steps are presented in the 2 slides above.

This problem has important implications in various other applications as well. For example in a cricket bat if a batsman can get the ball at the center of percussion of the bat (sweet spot) with respect to his/her hand (considered as a hinge), then the batsman will not feel any impulsive reaction of the ball. The same thing also applies for the tennis racquets.

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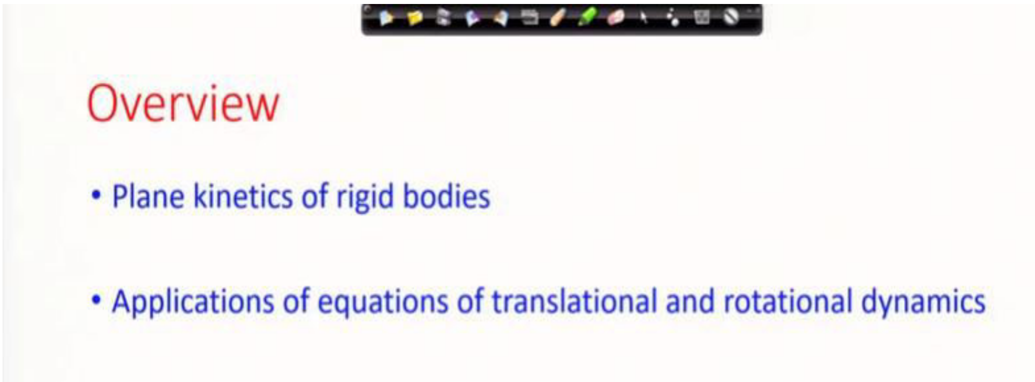

The discussions are summarized in the slide above.