MEEN 432 –Automotive Engineering

Fall 2026

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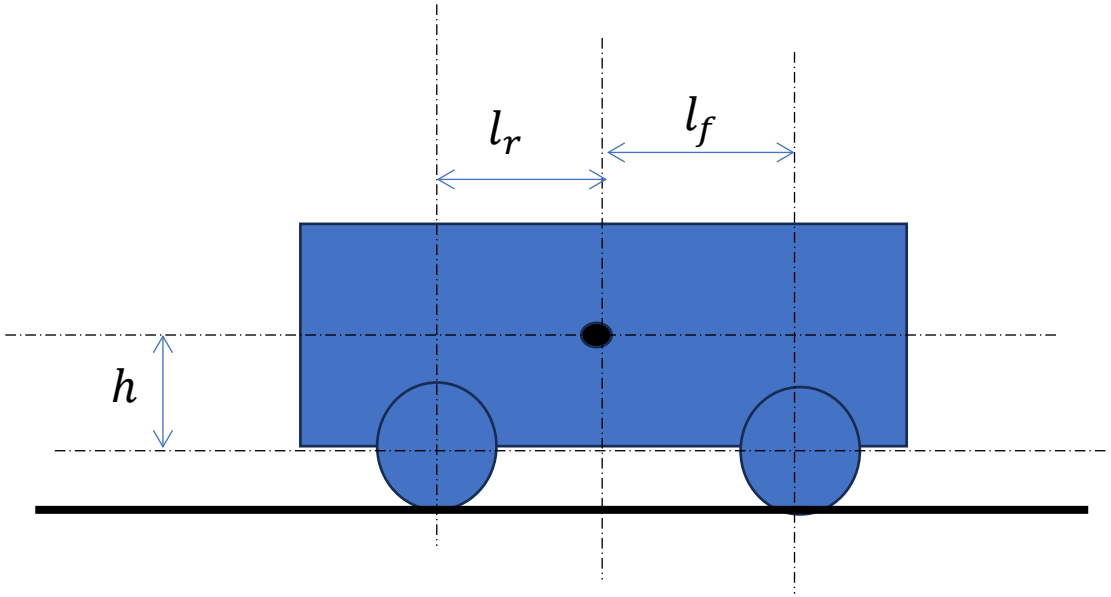
Lecture 19: Drag Racing!

- Weight Shift during Acceleration

Weight Shift During Acceleration

- The normal force on the two tires are based on the weight distribution:
  - $N_{r,s} = \frac{l_f}{l_f+l_r} mg; N_{f,s} = \frac{l_r}{l_f+l_r} mg$
- Given a tractive force F_x torque on wheels is:
  - $\tau_w = F_x r_W \approx m a r_W$
- There is an opposite (reaction) torque that we have so far ignored, but can be significant:
  - This results in a changed reaction force at the steering axle:
  - $N_f(l_f + l_r) = mgl_r - \tau_w$ Or
  - $N_f = N_{f,s} - mar_w/(l_f + l_r)$



In Drag Racing, there is high μ on the drive (rear) tires, enabling a large a. However this results in low N_f, which in turn results in low C_α (lateral stiffness) Which in turn makes steering a challenge!