

Homework #4
MEEM4450/5450
(40 Points due 3/18/13)

Supplement the vehicle data given for the example problem on page 75 of your text with the data given below to answer the following questions.

I_f	12 in-lb-sec ²
I_r	13.5 in-lb-sec ²
f_0	0.013
f_1	$6.5 \times 10^{-7} \text{ s}^2/\text{ft}^2$
Frontal area	2.00 m ²
C_d	0.35
ρ	0.00236 lb-sec ² /ft ⁴
Unsprung weight	400 lbs

1. Assume constant braking force, no aerodynamic drag or rolling resistance. Include the rotational inertia of the front and rear axle assemblies. What is the traction limited stopping distance from an initial speed of 60 mph on level ground? What is the total energy absorbed by the brake system for this stop? Assume $\mu=0.8$
2. Rework problem 1. This time include the aerodynamic and rolling resistance terms.
3. Use the rotational inertia terms given in the data below and recalculate the 200 psi and 600 psi lines in the table on page 76 of Gillespie.
4. Include the aerodynamic data and rolling resistance terms in your analysis and calculate the minimum stopping distance for the vehicle and braking system described in the example on page 76 of Gillespie. Do it for a coefficient of friction of 0.8 and 0.3 and determine which axle will lock up first in each case. Assume a constant brake pressure will be applied.

