Vm240 Project 1: A Double-Car Freight Train Problem

The 800-kg car at B is connected to the 350-kg car at A by a spring coupling. The initial velocity is 0. Regard rolling friction as sliding friction. There are no brakes are applied to car A. The system finally reaches a stable state (i.e., the two cars were relatively stationary). Determine the stretch in the spring if:

(a) the wheels of both cars are free to roll

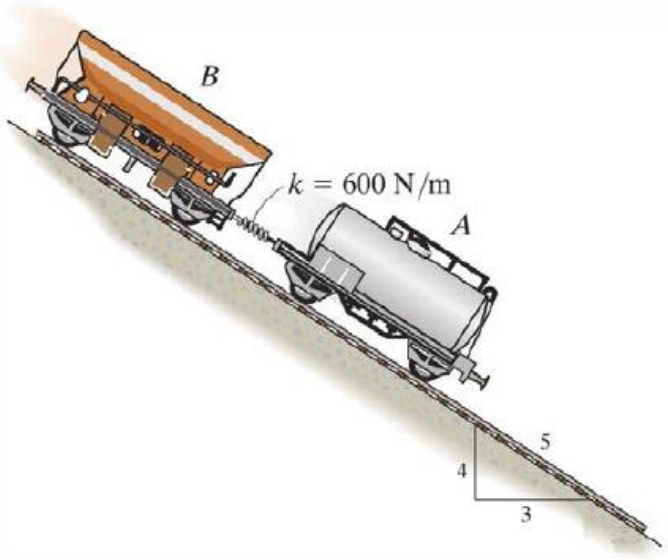
(b) the brakes are applied to all four wheels of car B, causing the wheels to skid. Take $(\mu_k)_B = 0.4$. Neglect the mass of the wheels.

(c) Assuming that the braking force of the car B is changeable and the maximum $(\mu_k)_B$ of car B is 0.6 and the maximum stretch of spring is 1.2 m, find the minimum acceleration of this system. Note that this is a simple linear programming (LP) problem. Can you write a simple program using MATLAB or any other proper programming language to solve this problem?

Please draft a short report no more than 1000 words to provide the necessary information to illustrate your idea in solving the problem. Can you also offer a short discussion on how you will solve a similar problem if more cars are present in the system? You are NOT required to provide the full solution but a simple discussion on your thoughts would be good.

In the report, you should at least include:

1. Title
2. Introduction on the problem
3. Illustration on the solution procedure
4. The key codes you use to solve relevant questions (Appendix can be used)
5. A short discussion on how computer programming can be done to solve a similar problem with more cars.
6. A conclusion


B
k = 600 N/m
A
5
4
3