Additional exercise 3

Due: Wednesday, 30 July 2025, 11:55 PM

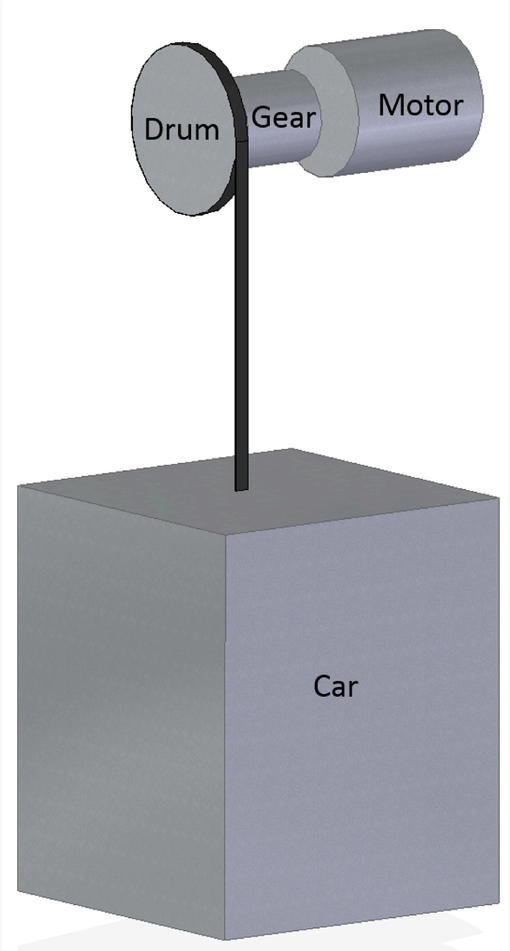
Optimizing an elevator

An elevator drive system consists of a DC motor, a gear attached to it, cable drum and the elevator car itself.

Assume that the DC motor can produce a constant torque of 48 Nm during the lifting operation. Optimize the cable drum diameter with Simulink and Matlab so, that the elevator car travels a distance of 2 m upwards as quickly as possible. You do not have to care about the velocity of the car when the 2 m distance is reached.

- Assume that the cable drum is a solid cylinder made of steel with a density of 7850 kg/m^3. The cylinder is 40mm wide.
- The mass of the elevator car is 200 kg.
- The maximum rotating speed of the motor is 1600 rpm.
- The gear ratio of the gear is 18.3.
- The optimized drum diameter should be between 0...1m.
- Simulation time of 10 s should be fine.
- You can try to restrict the maximum step size if there are convergence problems.

Submit your model, script and a .pdf report which shows the model and the equations for the reduced equivalent moment of inertia, the optimal drum diameter and a plot the velocity of the car.



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Submission status

Submission status	No submissions have been made yet
Grading status	Not graded
Time remaining	158 days 11 hours remaining