intro.exe Exercises for Chapter intro

Exercise intro.playmate

Consider the illustration of Fig. exe.1 in which a bending plate scale is to have a heavy load placed upon it. Such scales measure the weight of the load by measuring the strain on the sensors and electronically converting this to the weight placed on the plate. (It goes without saying that calibration is required for such systems.)
It takes time for the system to come to equilibrium, during which oscillation occurs. Develop a one-dimensional lumped-parameter model of the mechanical aspect of the system and its applied load, via the following steps.

1. Declare what you will take to be the system and its input(s).
2. Declare a one-dimensional, mechanical, lumped-parameter model for the system. How might you determine the lumped-parameter model parameters (e.g. mass, spring constant, etc.)?
3. Sketch the lumped-parameter system model.
4. Draw a linear graph corresponding to your lumped-parameter model.

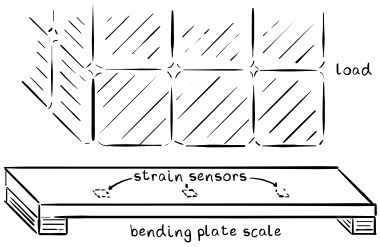

Figure exe.1: a bending plate scale with strain sensors and load.

Exercise intro.madrid

Consider the drivetrain of a standard internal combustion engine vehicle. When accelerating

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from a stop in wet weather it is common for the wheels to slip due to a film of water between the wheels and the road. Develop a lumped parameter model of this system with the following assumptions,

- the engine and transmission together can be simulated as a torque source,
- the transmission and wheels are connected with a drive shaft of finite stiffness, and
- each wheel has equal mass.

From this description please,

1. draw a one dimensional lumped parameter model (like the diagrams in problem granda), and
2. draw a linear graph of the lumped parameter model.

Linear graph models