ME729 Advanced Robotics - Homework #8

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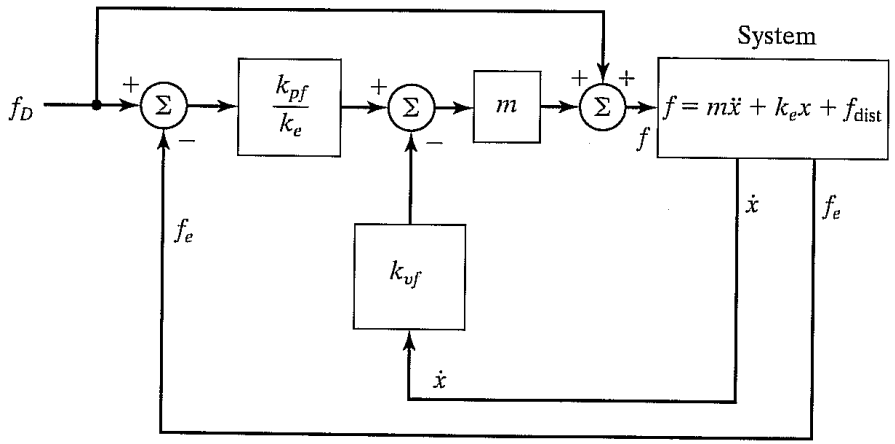
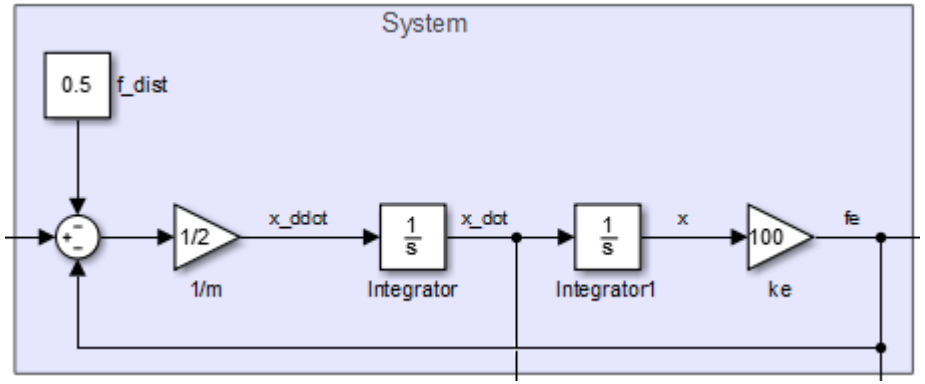
Email me *a pdf file* by next Monday 6 p.m.

- Consider the mass-spring model given by the lecture.
- Let $m = 2\ kg$, $k_e = 100\ N/m$, and $f_{dist} = 0.5\ N$
- Initial conditions : $x = 0\ m$ and $\dot{x} = 0\ m/s$
- Desired force : $f_d = 1\ N$





[The Simulink blocks for the System]

[Simulation problems using Simulink]

1. Realize the practical force control system with the Simulink blocks for the System. [5]

2. Find gains (k_{pf} and k_{vf}) to make a good response (no steady-state error, no overshoot and the settling time less than 1 second) and attach the response graph. [4]

3. When $k_{pf} = 1$ and $k_{vf} = 11$, the response have steady-state error. To get rid of the error, we can use an integral controller. Add the integral controller in the control loop. Then find I gain (k_I) to make a good response also and attach the response graph. [1]