Control of Linear Vibrations

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Chapter 1

Model

$$\Big(\frac{J}{R_d} + M\Big)\ddot{x} + C\dot{x} + Kx = \frac{r(t)}{Rd} - \mu\,\mathrm{sign}(\dot{x})$$

$$\theta = \frac{x}{R_d}$$

$$\mathcal{L}\{r(t)\} = 2K_e \frac{1}{2R + 2sL}(\mathcal{L}\{v(t)\} - 2K_e s\mathcal{L}\{\theta\})$$

1. $\mathcal{L}\{\cdot\}$ Laplace transform.
2. J Disk inertia.
3. M Cart+load mass
4. C Spring damping.
5. K Spring stiffness.
6. $r(t)$ Torque.
7. R_d Disk radius.
8. μ Coloumb friction coefficient.
9. θ angle of the disk.
10. $v(t)$ tension applied to the motor.
11. R, L resistance and inductance of the motor
12. K_e backemf constant.