Q1:

For a two-mass system,

1) Build the simulink model and plot the Bode plots for the 5 cases of Ks=100Nm/rad, Jm+Jl=2Nm, Jm=q\*(Jm+Jl) and the inertia ratio q=0.1, 0.3, 0.5 0.7, 0.9, respectively;

2) Explain why the two-mass system is difficult to control when q is large (Hint: pole-zero cancelation leads to poor robustness).

A1:

Q2:

1. Derive the transfer function for the three-mass system;
2. Build the simulink model and plot its Bode plot suppose Ks=100Nm/rad, Kg=1000Nm/rad, Jm=1Nm, Jl=1Nm Jg=0.1Nm, respectively. (The dead zone nonlinearity should be neglected because transfer function can only describe linear systems);
3. Compare with the frequency response of the two-mass model when the dynamics of the gear is neglected.

A2: