MECH 467 - Tutorial 6 - State Space

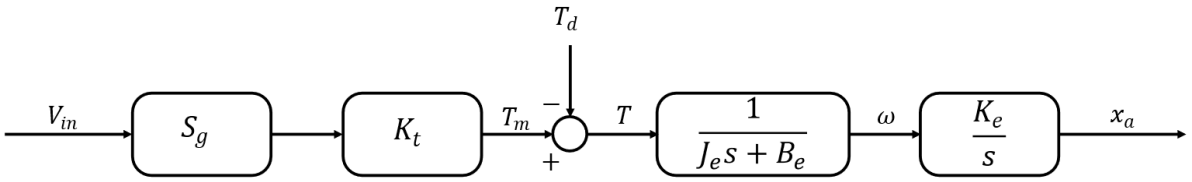

Fig. 1. Open loop representation of a ball screw feed drive table

1) Derive A, B, C and D matrices of the discrete state space form for the open loop system shown in Fig. 1. Consider a sampling time of T.

$$\{x(k+1)\} = [A]\{x(k)\} + [B]\{u(k)\}$$
$$\{y(k)\} = [C]\{x(k)\} + [D]\{u(k)\}$$

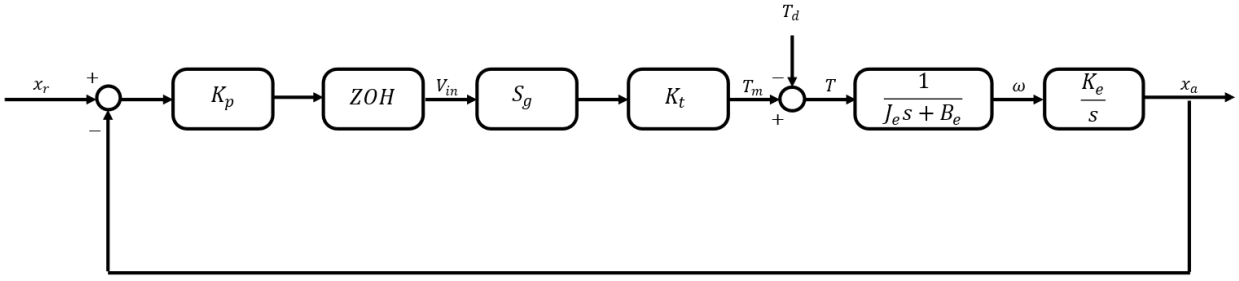

Fig. 2. Closed loop representation of a ball screw feed drive table with unity feedback

2) As shown in Fig. 2, assume the system is closed with a proportional controller and unity feedback. Update the state space model of the system for the closed-loop representation.