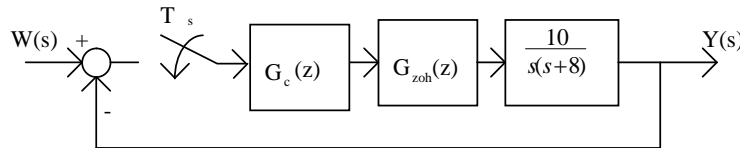


1. Given the following digital control system for a servo with open-loop transfer function $G(s) = 10/(s(s+8))$:



- a) Find an S-domain model for the open-loop system including the ZOH if $T_s = 10$ msec.
 - b) Given the following transient specifications: $t_s \leq 0.4$ sec and $M_p \leq 2\%$. Illustrate the region of the s-plane where we must place our dominant poles to satisfy these specs.
 - c) Pick a pair of dominant closed-loop poles to meet the above specs then sketch the root locus. Does the root locus pass thru the desired poles? If not, design a PD compensator (filter) $G_c(s)$ then find $G_c(z)$ (using the approximation derived in class) to force the root locus to pass thru these poles and meet the specs given in part d).
 - d) Find the closed-loop step response and measure the settling time and overshoot.
- 2 a) Use the 2nd Ziegler-Nichols method to tune a PID control for this system
- b) Now find $G_{PID}(z)$ (using the approximation derived in class)
 - c) Write a flow chart similar to the one derived in class to implement your PID digital control