Dc motor servomechanism

Engineering

Obtaining response characteristics involved the calculation of the second-order approximations and reading the real step response from the MATLAB graph. The resultant equations were fixed to the MATLAB code on the basis of users' damping ration, dominant pole, p (f), z as well as gain, K. Steady-state error was obtained as

In the experiment, there is a need to determine the point that corresponds to a response outcome bearing 0. 5s settling duration. The MATLAB code below can be applied to determine the point, which adds a zero, yielding a new function for transformer Gc(s).

The operating point of the compensated system bears a similar damping ration as the uncompensated system. Compensated system portrays more negative real parts compared with uncompensated, thus the settling time for the compensated system is shorter.

Use G(s) as a function of the uncompensated system to graph root locus and assess where it crosses the ratio line (0. 8) from which the gain and selection point, Ps, can be determined. Identify the gain selection point, Po and graph step response using MATLAB then obtain percentage OS, Ts, Tp, ξ, ωn and Kappos.

The uncompensated system gain is lower than lead compensated systems while the operating points are similar. The peak times, damping ratio, as well as the settling times of the compensated system, is lower than that of the uncompensated system. The % overshoot is lowered to 0 percent to lead compensated systems from uncompensated. As such, Zc= 1. 8 increases after the initial lead compensation.