

DC Motor Servo Control

This simulation utilizes a cascaded control topology with an inner current loop, a speed loop, and an outer position loop. The current regulator is a standard parallel PI controller. The speed regulator uses a PI controller with a dynamically clamped integrator. The outer position loop is simply a proportional controller. This simulation also shows the effects of dual sampling frequencies, where the current loop is sampled at 10kHz but the speed and position loops are sampled at 2kHz. Since this is a digital control loop simulation, it also models some of the peripherals found in a digital control system, such as an ADC and PWM module. It is assumed that the exact value of motor speed and position are known, and they are used as the feedback signals for their respective loops.

TRANSIENTS: At $t=0$, the commanded position is set to zero. At $t=5\text{mS}$, the commanded position is changed to be one tenth of a revolution. At $t=50\text{mS}$, a load of 0.6 N-M is applied to the motor shaft to demonstrate the disturbance rejection capability of the position controller.

PLOTS: Commanded Position, Actual Position, Commanded Speed, Actual Speed, Commanded Current, and Sampled Feedback Current.

REQUIREMENTS: [Spice Executable](#), [Support Pack](#)

Unzip the files for this simulation into the same folder as the files extracted from the Support Pack. Then run "11 DC Motor Digital Servo Control.asc".