Analysis of DC Current Regulators for High Performance Drives

<u>DC Machine and Current Regulator</u>

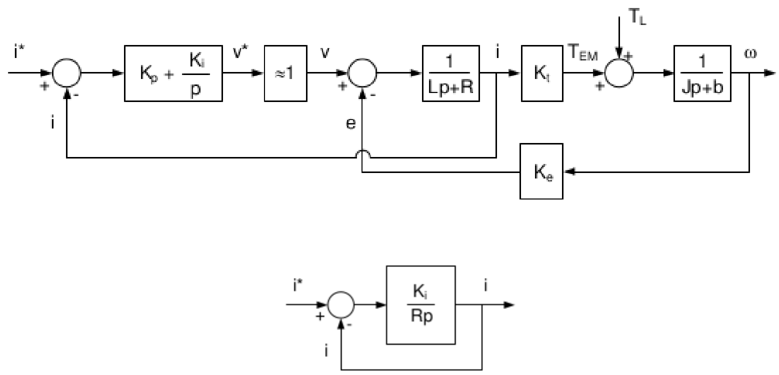
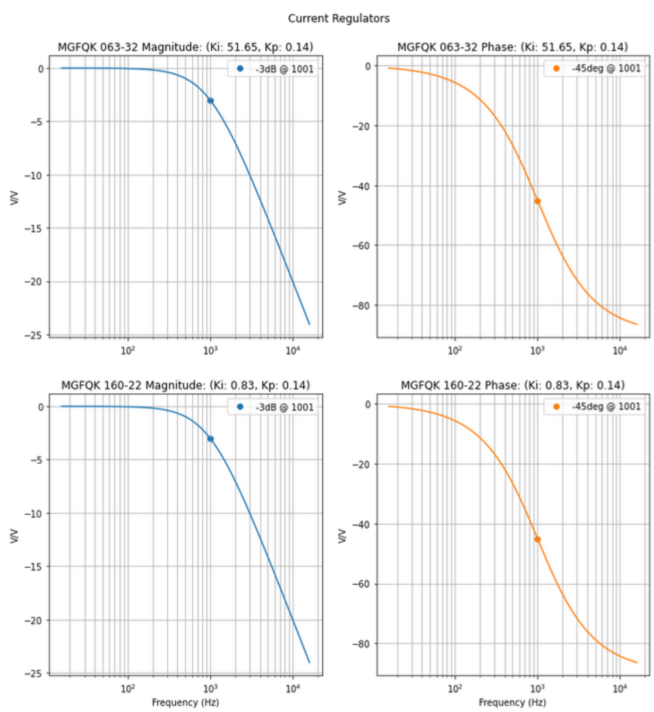
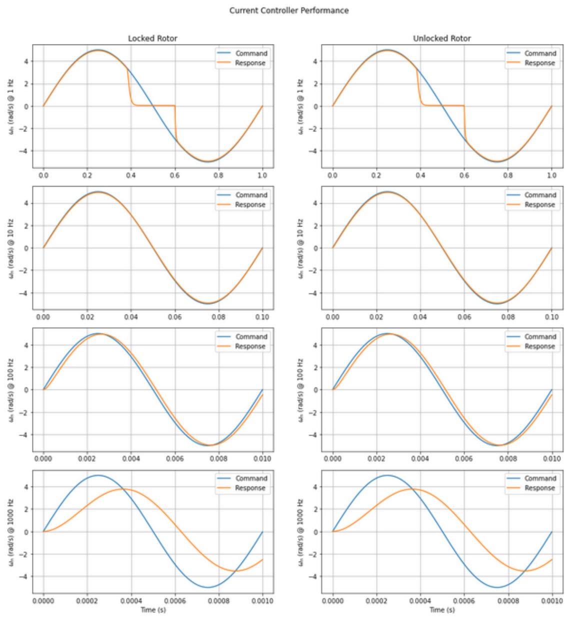


Fig. 1. Solving for Current Regulator Gains

$$\frac{I}{I^*} = \frac{K_{tot}}{K_{tot}+1} \text{where } K_{tot} = \frac{K_i K_v}{R_a} \tag{1}$$



Current command and response



Performance Rotor Locked

Fig. _ Analyzing speed performance with varying carrier frequencies and locked rotor

The motor speed oscillates with locked rotor conditions. At lower carrier frequencies, the oscillations increase. Specifically, 1Hz carrier frequency reaches the upper limits of the saturation block (680V) and results in clipped speed at 544 rad/s. The MGFQK 063-32 steady state mean is _ for 1Hz, 10Hz, 100Hz, 1000Hz carrier frequencies respectively. The

Fig. _ Analyzing speed performance with varying carrier frequencies and unlocked rotor

Performance Rotor Unlocked