

# Digital Control in Power Electronics

## Analysis and implementation of Multisampled PWM for high bandwidth and output frequency current control of electrical drives

### Simulation results

Ruzica Cvetanovic

November 28, 2020

## 1 Our controller: UR=8 with MAF, IMC

Parameter  $\alpha = 0.0636$  for our controller is set to obtain the same cross-over frequency as with UR=2 no MAF,  $\alpha=0.25$ . Open-loop Bode plots for two cases of interest are shown in Fig. 1-2. Corresponding step responses from simulation with dead-time at 270Hz output frequency are shown in Fig. 3-4. Comparison between analytical and simulated open and closed loop frequency response at 270Hz output frequency is shown in Fig. 5-6. Note that the frequency response analysis (FRA) in Simulink is done without dead-time.

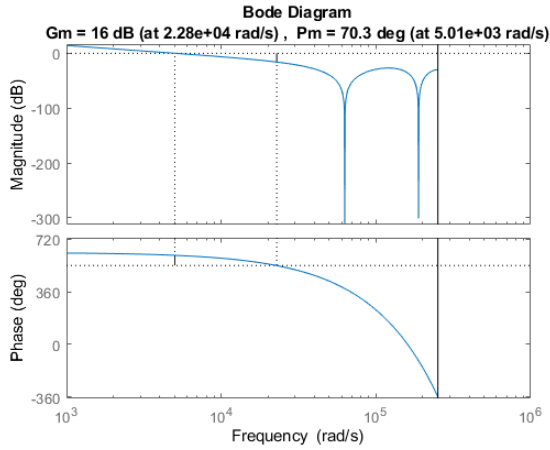


Fig. 1. Open-loop Bode plots: UR=8 with MAF  $\alpha = 0.0636$ .

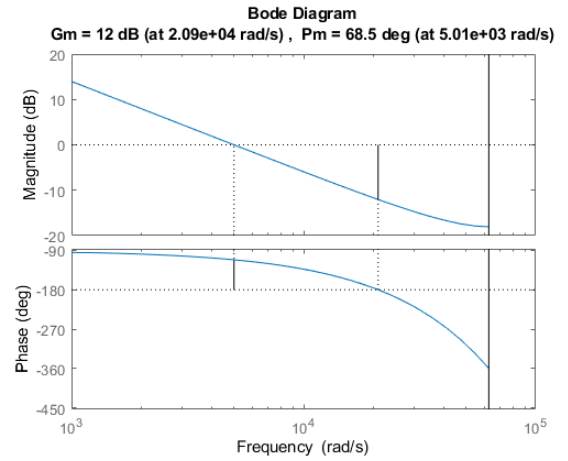


Fig. 2. Open-loop Bode plots: UR=2 no MAF  $\alpha = 0.25$ .

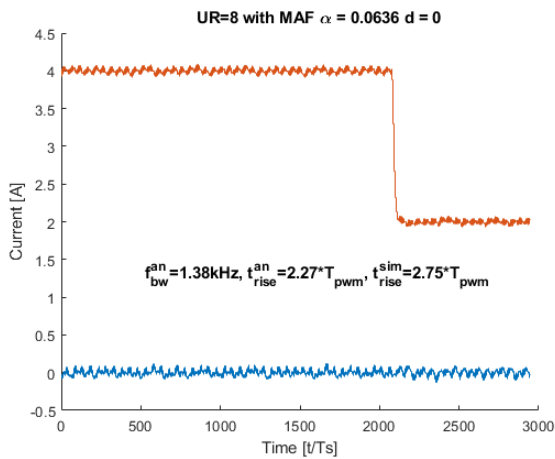


Fig. 3. Sim. step response: UR=8 with MAF  $\alpha = 0.0636$ .

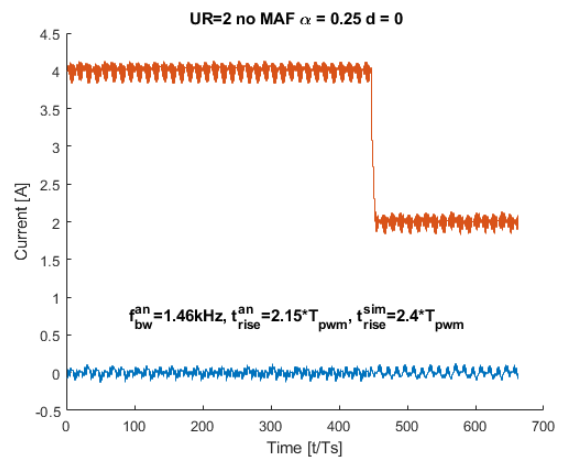


Fig. 4. Sim. step response: UR=2 no MAF  $\alpha = 0.25$ .

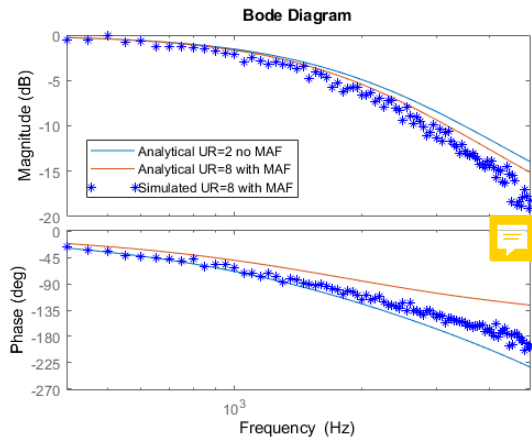


Fig. 5. Sim. closed-loop FRA: UR=8 with MAF  $\alpha = 0.0636$ .

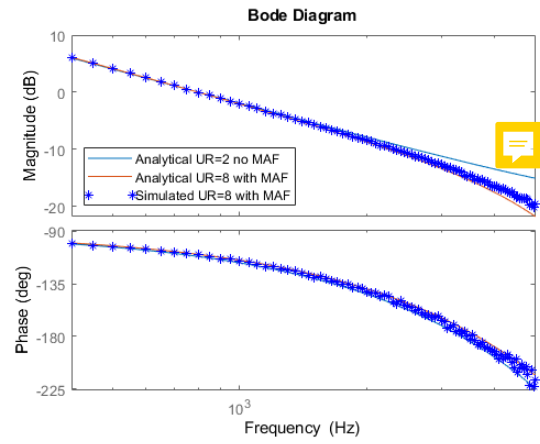


Fig. 6. Sim. open-loop FRA: UR=8 with MAF  $\alpha = 0.0636$ .