Appendix I

This appendix presents tracking responses for the closed loop systems with two benchmark processes FOS, TOPDT controlled by the corresponding DMC algorithm in the noiseless case. The results are shown for two DMC tuning methods (SC and RH for $x = 0.1$). A reference DMC (REF) is designed based on noiseless step response samples obtained directly from the original process while FOPDT- and SOPDT denote DMC design respectively based on samples of the FOPDT and SOPDT approximating model samples.

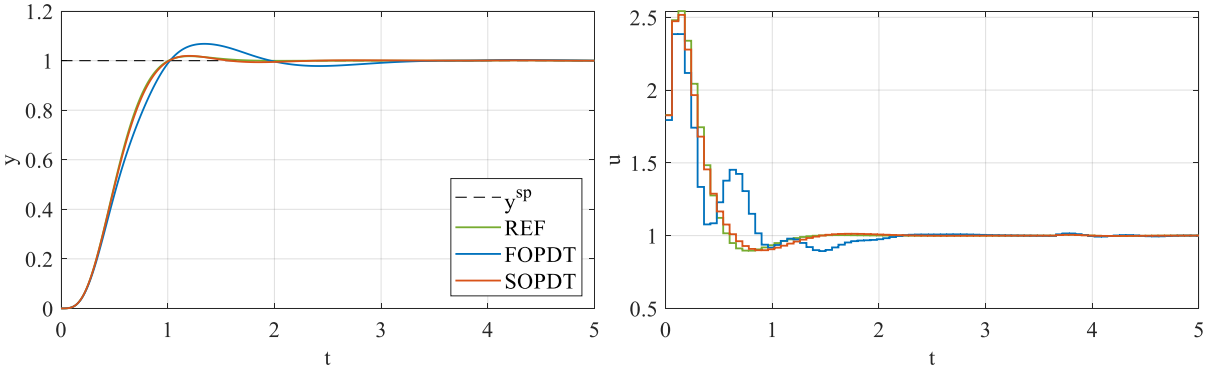

*Fig. A 1 Comparison of DMC tuned based on **SC** tuning rules and original process response samples (REF) and its FOPDT and SOPDT approximations for tracking - process value (left plot) and manipulated value (right plot) for **FOS** benchmark process*

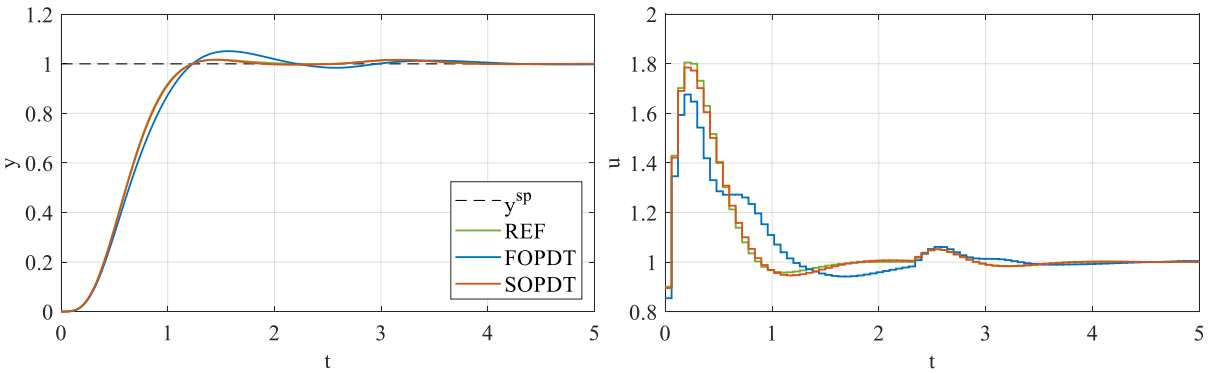

*Fig. A 2 Comparison of DMC tuned based on **RH (x=0.1)** tuning rules and original process response samples (REF) and its FOPDT and SOPDT approximations for tracking - process value (left plot) and manipulated value (right plot) for **FOS** benchmark process*

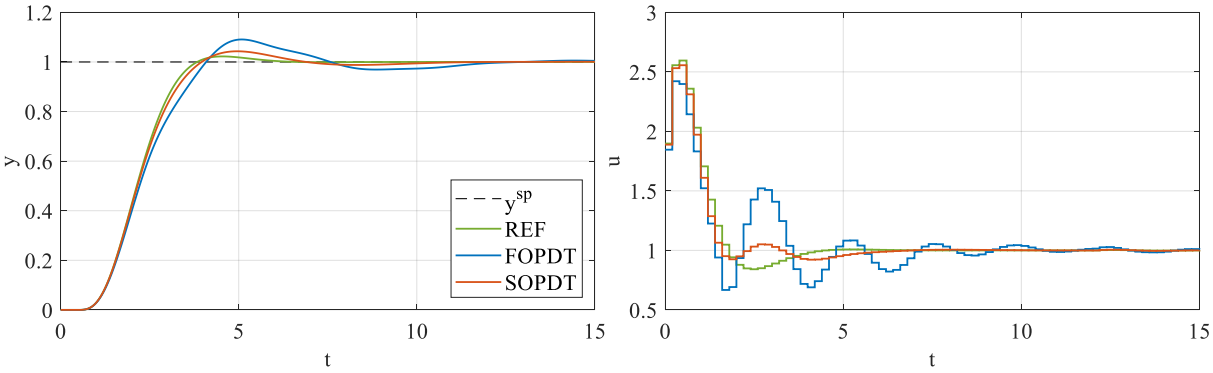

*Fig. A 3 Comparison of DMC tuned based on **SC** tuning rules and original process response samples (REF) and its FOPDT and SOPDT approximations for tracking - process value (left plot) and manipulated value (right plot) for **TOPDT** benchmark process*

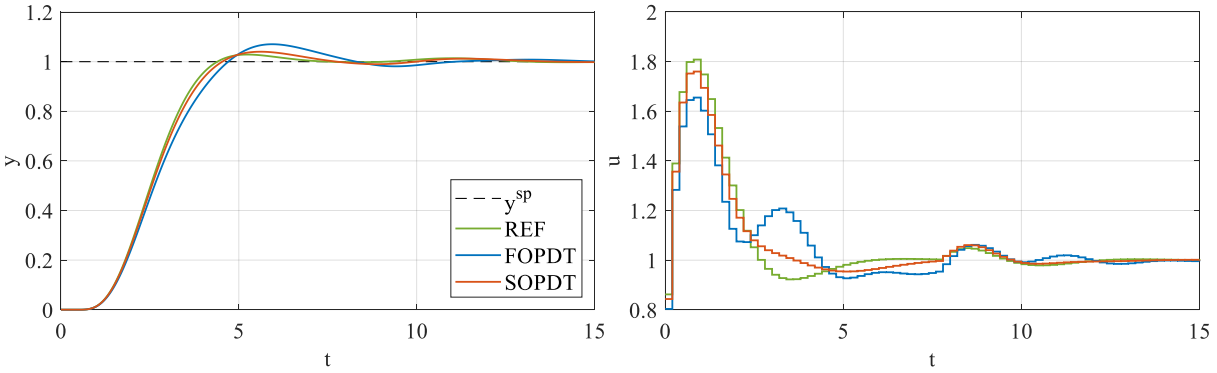

*Fig. A 4 Comparison of DMC tuned based on **RH (x=0.1)** tuning rules and original process response samples (REF) and its FOPDT and SOPDT approximations for tracking - process value (upper plot) and manipulated value (lower plot) for **TOPDT** benchmark process*

Appendix II

This appendix presents tracking responses for the closed loop systems with two benchmark processes FOS, TOPDT controlled by the corresponding DMC algorithm in the case of present measurement noise. The results are shown for two DMC tuning methods (SC and RH for $x = 0.1$). A noisy reference DMC (REFn) is designed based on noisy step response samples obtained directly from the original process while FOPDT- and SOPDT denote DMC design respectively based on samples of the FOPDT and SOPDT approximating model samples.

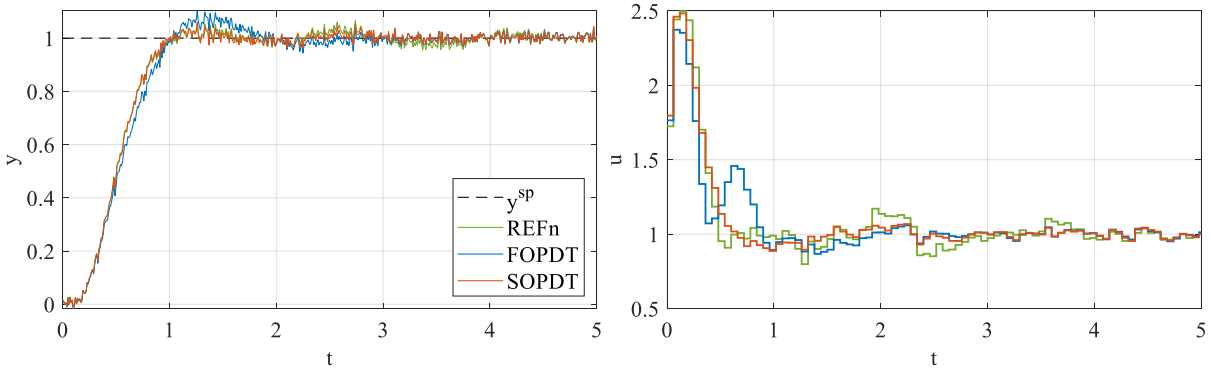

*Fig. B 1 Comparison of DMC tuned based on **SC** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (σ^2 =0.0002) - process value (left plot) and manipulated value (right plot) for **FOS** benchmark model.*

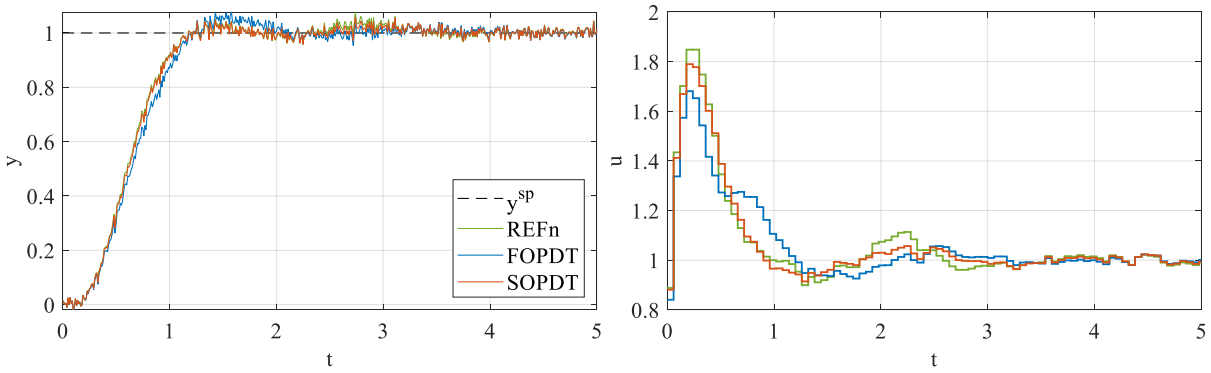

*Fig. B 2 Comparison of DMC tuned based on **RH (x=0.1)** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (σ^2 =0.0002) - process value (left plot) and manipulated value (right plot) for **FOS** benchmark model.*

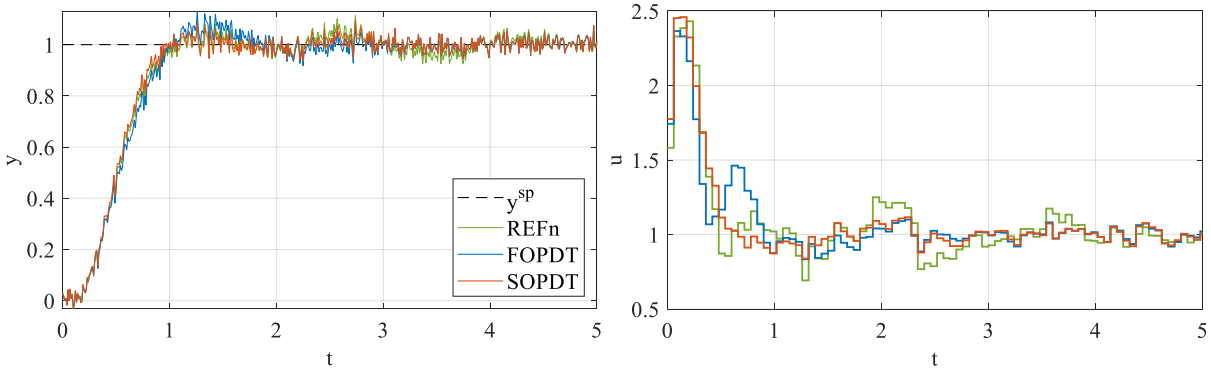

*Fig. B 3 Comparison of DMC tuned based on **SC** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (σ^2 =0.0006) - process value (left plot) and manipulated value (right plot) for **FOS** benchmark model.*

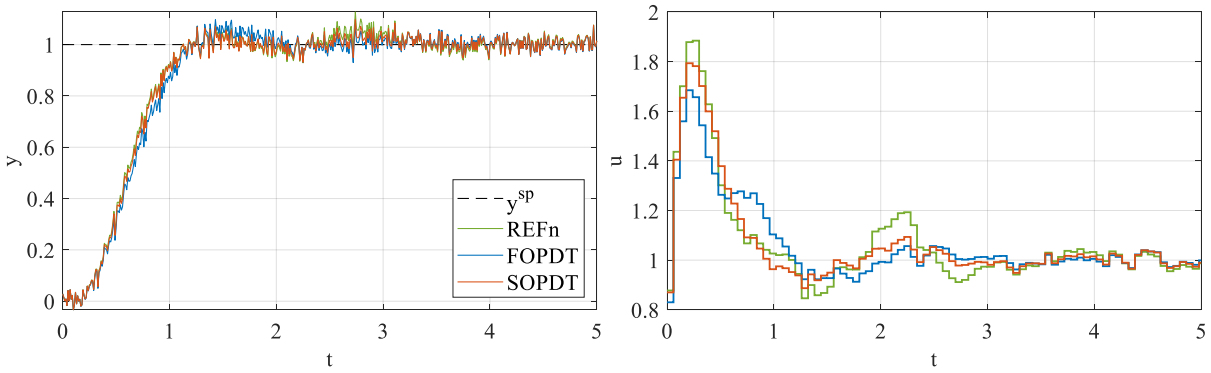

*Fig. B 4 Comparison of DMC tuned based on **RH (x=0.1)** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (σ^2 =0.0006) - process value (left plot) and manipulated value (right plot) for **FOS** benchmark model.*

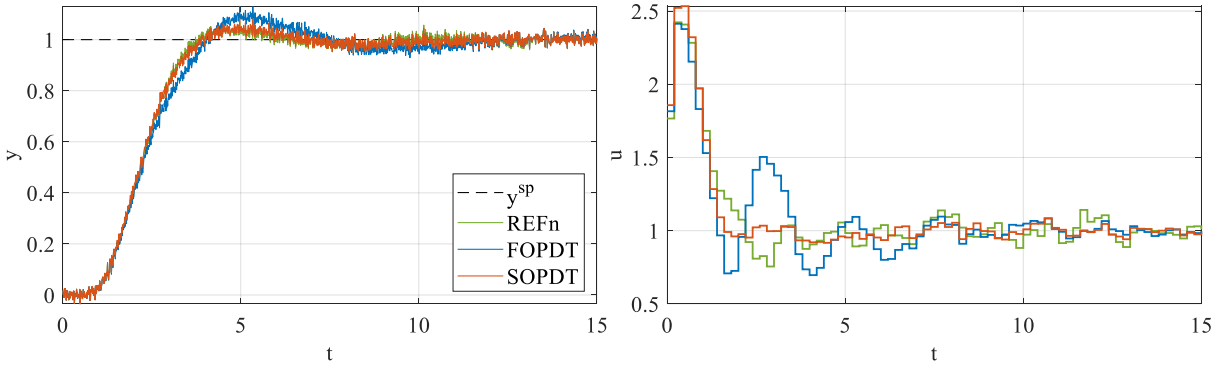

*Fig. B 5 Comparison of DMC tuned based on **SC** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (σ^2 =0.0002) - process value (left plot) and manipulated value (right plot) for **TOPDT** benchmark model.*

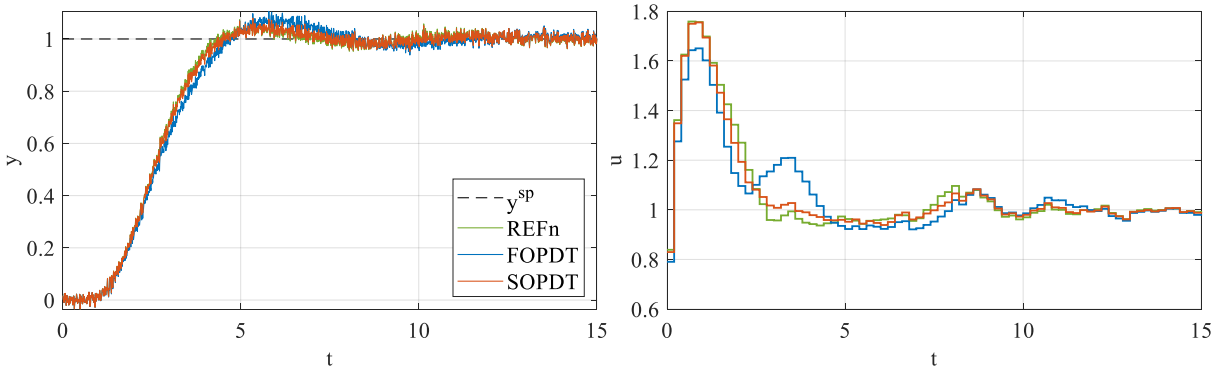

*Fig. B 6 Comparison of DMC tuned based on **RH (x=0.1)** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (σ^2 =0.0002) - process value (left plot) and manipulated value (right plot) for **TOPDT** benchmark model.*

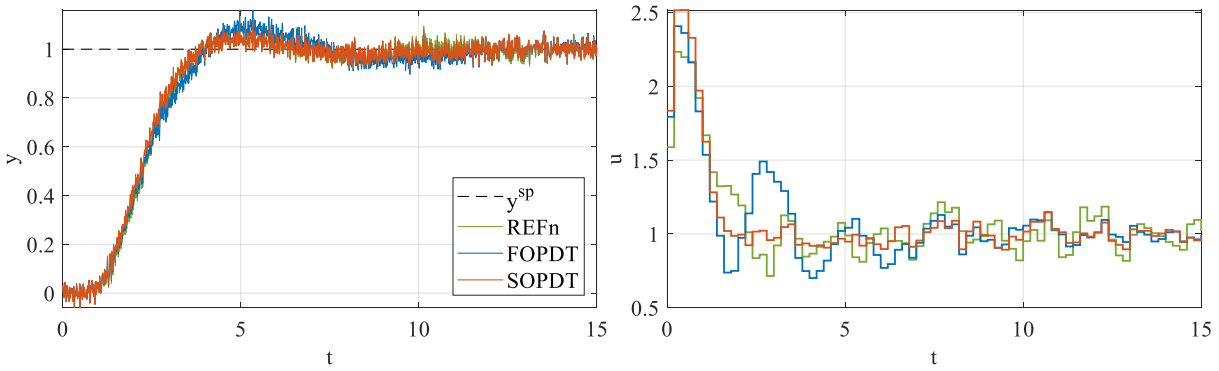

*Fig. B 7 Comparison of DMC tuned based on **SC** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (**σ^2 =0.0006**) - process value (left plot) and manipulated value (right plot) for **TOPDT** benchmark model.*

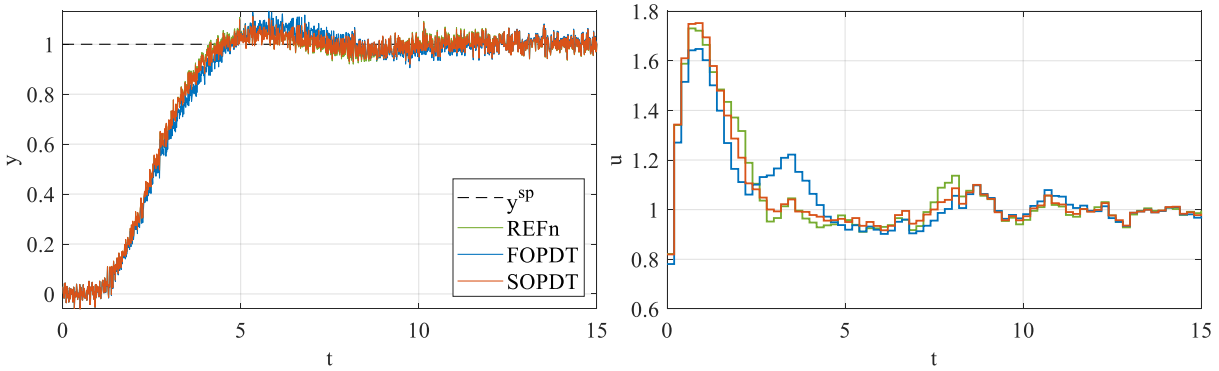

*Fig. B 8 Comparison of DMC tuned based on **RH (x=0.1)** tuning rules for original, noisy process response samples (REFn) and its FOPDT and SOPDT approximations for tracking with included measurement noise (**σ^2 =0.0006**) - process value (left plot) and manipulated value (right plot) for **TOPDT** benchmark model.*