To develop a suitable control model of the process, PRBS (pseudo random binary sequence) step tests were applied on the flowsheet MSMPR cooling rate (as shown in Figure 16.20).

Using the PRBS data, an empirical time series control model was developed. Then, the MPC controller was designed to adjust the MSMPR cooling rate to maintain the solute concentration to its desired supersaturation profile (C^*). The control results are shown in Figure 16.21. This shows that the controller, designed only using the flowsheet model, was able to effectively maintain the concentration, C on the desired supersaturation profile, C^* through the real-time adjustment of the vessel temperature.

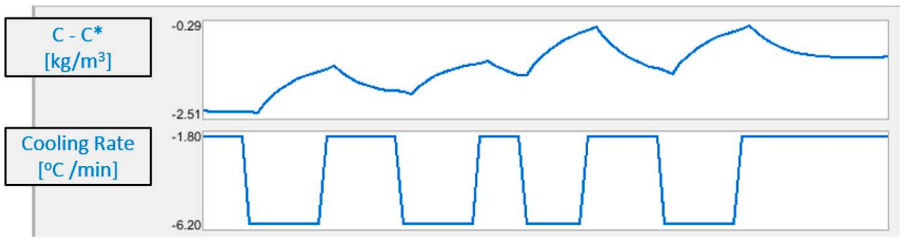

Figure 16.20 PRBS step tests on the flowsheet MSMPR cooling rate.[15]

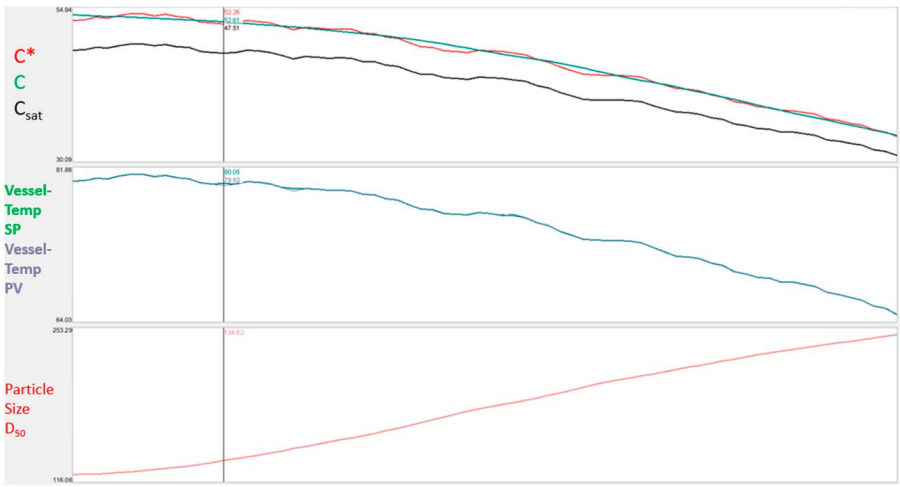

Figure 16.21 MPC control results using the digital design approach[15].