Enhancing polymer production with non-linear model-predictive control to minimize waste and reduce environmental impact

Chris Leingang[†], Sang Phil Han
Siemens Process System Engineering
(Chris.Leingang@Siemens.com[†])

While linear model-predictive control (MPC) has been applied very effectively to large-scale continuous plants for 30 years, it cannot easily be applied to high-value batch or semi-continuous processes with multiple products and frequent grade changes, such as polymer production. One of the most exciting recent developments is viable non-linear MPC. NLMPC is now becoming a reality because of the availability of accurate, physics-based process models, the increased speed and robustness of solution techniques, and the availability of real-time data delivered by recent digitalization initiatives. The presentation describes the application of NLMPC to polymer processes for continuous quality monitoring, yield maximization and acceleration of grade change to minimize production of low-value off-spec material. The promising early results show that NLMPC has the potential to add around a week's on-spec production to a typical plant annually, while reducing wasteful rework and emissions.