Property control in a continuous polymerization reactor using Wiener type predictive controller with one step identification

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In this study, an experimental work was carried out for the identification and control of a continuous methyl methacrylate(MMA) solution polymerization reactor by using a Wiener model. We developed a one step identification method for the Wiener model. The linear time invariant and inverse static nonlinear parts were simultaneously identified by adopting the subspace identification method. The matrix input/output equation was reformulated in such a way that the output of the nonlinear process could be directly inserted in the matrix input/output equation. In the present identification scheme, therefore, there is no need to perform any iteration, which is commonly needed in the conventional scheme. On the basis of the identified model for the polymerization reactor, a Wiener-type input/output data-based predictive controller was designed and applied to the polymer quality control in the continuous MMA polymerization reactor by conducting online digital experiments with online densitometer and viscometer. It was observed that the proposed controller performed satisfactorily for the polymer quality control in the multiple-input multiple-output (MIMO) system.