

Forecast of Polyethylene Properties in the Gas Phase Polymerization Aided by Neural Network

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Abstract : A major problem that affects the quality control of polymer in the industrial polymerization is the lack of suitable on-line measurement tools to evaluate the properties of the polymer such as melt and density indices. Controlling the polymerization in ordinary method is performed manually by taking samples, measuring the quality of polymer in the lab and registry of results. This method is highly time consuming and leads to producing large number of incompatible products. An online application for estimating melt index and density proposed in this study is a neural network based on the input-output data of the polyethylene production plant. Temperature, the level of reactors bed, the intensity of ethylene mass flow, hydrogen and butene-1, the molar concentration of ethylene, hydrogen and butene-1 are used for the process to establish the neural model. The neural network is taught based on the actual operational data and back-propagation and Levenberg-Marquart techniques. The simulated results indicate that the neural network process model established with three layers (one hidden layer) for forecasting the density and the four layers for the melt index is able to successfully predict those quality properties.

Keywords : polyethylene, polymerization, density, melt index, neural network

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