过程系统工程

利用B样条神经网络实现聚合反应分子量分布的建模与控制

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摘要　　介绍了以B样条函数作为基函数的神经网络的基本结构和特性，提出了利用B样条神经网络建立聚合物分子量分布（MWD）模型的方法和拓扑结构，以及基于模型预估的控制MWD的新方法. 根据预估的分子量分布数据和事先确定的性能指标，使用最优化方法，计算出控制序列，使过程输出达到给定的理想分布. 以某实验室规模的苯乙烯聚合反应为仿真对象，研究了此方法的建模与控制实现，证明了方法的可行性.

关键词　　B样条神经网络　　分子量分布　　建模　　控制

分类号

MWD MODELING AND CONTROL FOR POLYMERIZATION *via* B-SPLINE NEURAL NETWORK

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Abstract

　This paper firstly introduces the structure and characteristics of B-spline-based neural network, and then presents a new approach to modeling and control of molecular mass distribution for polymerization. Utilizing the nonlinear mapping of B-spline functions and iterative minimum least square algorithm, the model of MWD in polymerization process has been built. Based on the MWD estimated by the neural network model and optimal performance index, the control sequences are synthesized in order to make MWD close to the target distribution. Taking a pilot scale rig, in which bulk polymerization of styrene takes place, as a simulated object, the modeling and control procedures are studied and implemented, and the feasibility of the approach is established.

Key words　B-spline neural network　molecular mass distribution　modeling　control

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