

SYSTEM ENGINEERING

输入训练神经网络的维数约简算法及其在化工过程建模中的应用

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摘要 Many applications of principal component analysis (PCA) can be found in dimensionality reduction. But linear PCA method is not well suitable for nonlinear chemical processes. A new PCA method based on improved input training neural network (IT-NN) is proposed for the nonlinear system modelling in this paper. Momentum factor and adaptive learning rate are introduced into learning algorithm to improve the training speed of IT-NN. Contrasting to the auto-associative neural network (ANN), IT-NN has less hidden layers and higher training speed. The effectiveness is illustrated through a comparison of IT-NN with linear PCA and ANN with experiments. Moreover, the IT-NN is combined with RBF neural network (RBF-NN) to model the yields of ethylene and propyl-ene in the naphtha pyrolysis system. From the illustrative example and practical application, IT-NN combined with RBF-NN is an effective method of nonlinear chemical process modelling.

关键词 [chemical process modelling](#), [input training neural network](#), [nonlinear principal component analysis](#), [naphtha pyrolysis](#)

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Dimensionality Reduction with Input Training Neural Network and Its Application in Chemical Process Modelling

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Key words [chemical process modelling](#); [input training neural network](#); [nonlinear principal component analysis](#); [naphtha pyrolysis](#).

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