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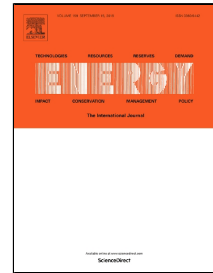
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ABSTRACT: With the increasing scale of modern petrochemical industries, energy modeling plays a more and more important role in energy-saving. However, it becomes more and more difficult to build accurate energy models due to the complicated characteristics of high nonlinearity, high dimension and strong coupling of modeling data. In order to tackle this problem, a novel latent variable based efficient functional link learning machine is proposed in this paper. In the proposed method, there are three salient features: first, a nonlinear function expansion block is used to extend the space of energy modeling data to highly nonlinear space for effectively solving the high nonlinear problem of energy modeling data; second, principal components based latent variables are extracted from the expanded space for removing redundant information; finally, an extreme learning algorithm based on generalized inverse is utilized to train the proposed model for achieving fast learning speed. To validate the performance of the proposed model, a case study of developing an energy model for a Purified Terephthalic Acid production process is carried out. Simulation results show that the proposed model can achieve not only extreme learning speed, but also acceptable accuracy.

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