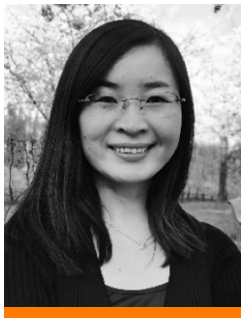
13:45

Aidong Hou

Section 2: Digital twin of production (Big Data)

Application of an artificial neural network to predict the thermal and thermomechanical behavior of refractory linings



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To facilitate industrial vessel lining design for various material properties and lining configurations, the back-propagation artificial neural network (BP-ANN) was applied to predict the thermal and thermomechanical behavior of refractory linings. A steel ladle from secondary steel metallurgy was chosen for a case study. Ten geometrical and material property variations of this steel ladle lining were selected as inputs for the BP-ANN model. A total of 160 lining configurations nearly evenly distributed within the ten variations space were designed for finite element (FE) simulations in terms of five orthogonal arrays. Leave-One-Out cross validation within various combinations of orthogonal arrays determined 7 nodes in the hidden layer, a minimum ratio of 1.6 between dataset size and number of input nodes, and a Bayesian regularization training algorithm as the optimal definitions for the BP-ANN model. The thermal and thermomechanical responses of two optimal lining concepts from a previous study using the Taguchi method were predicted with acceptable accuracy.

There may be changes in the time schedule.
See the current information on the website