10:05

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Section 2: Digital twin of production (Big Data)

Computational modeling and prediction on viscosity of slags by Big Data mining

The properties of slag (such as viscosity and conductivity) are significantly affecting metallurgical process and slag recycling. Existing research studies related to slag properties mainly used traditional experimental measurement and theoretical modeling approaches. Nowadays, the idea of data-driven decision making has been widely used in many fields instead of expert experience. Therefore, first of all, this study investigated the prediction of electrical conductivity based on Big Data mining methods. The results show that the slag conductivity can be predicted through constructing predictive models, and the Gradient Boosting Decision Tree (GBDT) model is the best prediction model with 90% accuracy and more than 88% sensitivity. The robustness result of the GBDT model demonstrates the reliability of prediction outcomes. Secondly, an advanced dual-stage predictive modeling approach is proposed in order to accurately analyze and predict the viscosity of slag. Compared with the traditional single data mining approach, the proposed method performs better with a higher recall rate and low misclassification rate. A two-equation model of six-degree polynomial combined with Arrhenius formula is also established for the purpose of providing theoretical guidance for an industrial application and reutilization of slag.