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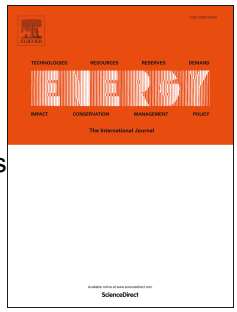


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# A dynamic model for the bed temperature prediction of circulating fluidized bed boilers based on least squares support vector machine with real operational data

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**Abstract—** Circulating fluidized bed (CFB) combustion is a new clean coal technology with advantages of wide fuel flexibility and low pollutant emissions. The bed temperature of CFB boilers is an important factor that influences operating security and pollutant emission generation. An accurate model to describe the dynamic characteristics of bed temperature is beneficial in reducing temperature fluctuations. This study presents a dynamic model for predicting the bed temperature of a 300 MW CFB boiler based on the least squares support vector machine method with real operational data. Coal feed rate and primary air rate are selected as the independent variables. The current values and previous sequences of the variables are considered as the model inputs to describe the dynamic characteristics of bed temperature. In addition, the past values of bed temperature are taken as feedback and then added to the inputs. The particle swarm optimization technique is used to determine optimal delay orders. Several model patterns are also discussed and compared. Comparison results show that the proposed model structure is reasonable and that the model can achieve the accurate prediction of the bed temperature.

**Keywords:** Bed temperature, Dynamic model, Least squares support vector machine, Circulating fluidized bed boiler, Operational data

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