

An Intelligent Method to Correlate Data for Coal Gasification Simulation

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In coal gasification simulation, the kinetic parameters of multiphase reaction and the coal ash viscosity have a great influence on gasification efficiency and gasifier security. The kinetic parameters and the slag viscosity are influenced by the mineral compositions of coal ash, coal rank and the location carbon conversion rate, etc.; The critical heat flux (CHF) of the water wall is influenced by the water's local degree of dryness, pressure and flow rate, etc. Therefore, the relationship between the influencing factors and the simulation parameters is a typical multi-factor nonlinear mapping relationship.

Through the accumulation of gasifier industrial data and experimental data, this essay developed a broader computation program to simulate the different coals gasification process. Compared with the traditional coal gasification simulation, this computation program have some characteristics:

- 1) Based on the analysis data of more than 100 kinds of coals, an optimization BP-neural-network algorithm was used to correlate data (such as components of ash and local carbon conversion rate, etc.) and the simulation parameters (such as kinetic parameters, Fig. 1). Iterative computation was carried out between the intelligent algorithm and the CFD algorithm.
- 2) A judgment for heat transfer deterioration (critical heat flux) condition, which also based on BP-neural-network algorithm, was added to the heat transfer analysis of water wall.

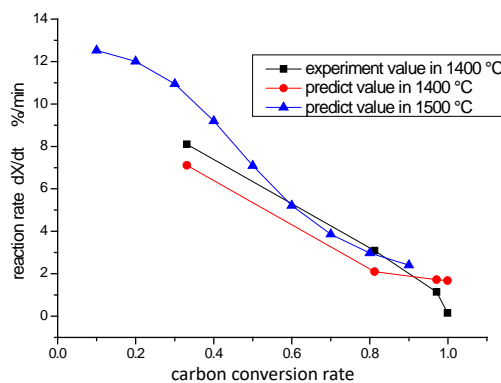


Figure 1 reaction rate varies with carbon conversion rate

References

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