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Large eddy simulation on a pulverized coal combustion furnace with a complex swirl burner HIROAKI WATANABE, KENJI TANNO, CRIEPI, RYOICHI KUROSE, SATORU KOMORI, Kyoto University — Large-eddy simulation (LES) is applied to a pulverized coal combustion field in a combustion test furnace with a complex swirl burner called the advanced low NOx burner CI-alpha, and its validity is investigated by comparing with the experiment. The motion of coal particles is calculated by the Lagrangian method with a parcel model. In the coal combustion modeling, three chemical processes are considered, namely devolatilization, char combustion and gaseous reactions. The direct closure SSFRRM (scale similarity filtered reaction rate model) is employed as a turbulent combustion model. The results shows that a swirling recirculation flow is formed in a central region close to the burner and its size and strength dynamically change with time. The predicted distributions of time-averaged and variance of particle velocity and time-averaged gaseous temperature, oxygen and NO concentrations are in general agreement with the experiment.

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