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Investigation on Wide-Load Regulation with Fuel Fluidized Modified Combustion System Coupling With a Thermal Combustible Particle Storage Unit

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Extended Abstract

To solve the problem arising from large-scale grid-connected power generation of new energy sources, realizing the stable operation of wide-load regulation in coal-fired boilers is imperative. Fuel fluidized modified combustion technology has good prospects in flexible peaking shaving aspect. Based on the above considerations, this study proposes a transformed strategy of adding thermal combustible particle storage unit in fuel fluidized modified combustion system to further improve the flexibility, and carries out the high-efficiency thermal energy regulation tests in the transformed system to explore fuel fluidized modified combustion, NO_x emission and load response characteristics in a wide load range. In a wide load range of 20% to 100%, this transformed system realizes long-term and stable operation, and combustion efficiency is above 98%. Compared to the untransformed system, this transformed system effectively reduces NO_x emissions, and realizes the ultra-low level of 47.05 mg/m^3 at 50% load. Additionally, the maximum load change rates for the untransformed and transformed systems are 2.77 %/min and 4.53 %/min respectively using the variations of the average temperature of boiler combustion side and the steam parameters of working fluid side as stable benchmarks. The transformed strategy proposed by this study can promote the further development of flexible peak shaving technology and provide theoretical support for the clean and efficient combustion of pulverized coal.