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INFLUENCE OF MAGNETIC FIELD EFFECT ON COLLECTION OF $PM_{2.5}$ IN HIGH-TEMPERATURE WIRE-PLATE ELECTROSTATIC PRECIPITATORS

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Abstract

Emission standards are becoming increasingly strict for large emitters such as coal-fired power plants, while high-temperature precipitators can effectively reduce polluting emissions. This work introduced a
++n external magnetic field into the electrostatic precipitator (ESP) to enhance the collection efficiency of a high-temperature wire-plate ESP for $PM_{2.5}$. Then a multi-physics field theoretical model was established, including electromagnetic, temperature, fluid, and particle dynamic fields. Based on this model, numerical simulations were performed to evaluate the collection performance of PM2.5 with R-R size distribution. The results indicate that $PM_{2.5}$ collection efficiency presents a nonlinearly decreasing trend with increasing temperature, while the external magnetic field can improve the collection efficiency of $PM_{2.5}$, and the promoted effect of magnetic field on collection efficiency is more significant in high temperatures. These findings mean that the external magnetic field in wire-plate ESP has important reference values for improving the collection performance of fine particles..

Key words: collection efficiency, high-temperature wire-plate ESP, magnetic field, $PM_{2.5}$, temperature field

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