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EXPERIMENTAL AND NUMERICAL STUDY ON CHARGING PROPERTIES OF CIGARETTE GRANULES UNDER ELECTROSTATIC FIELD

Abstract

In the process of aero engine operation, the accumulation of a large number of soot particles produced by combustion at the nozzle will affect the overall performance of the engine. The introduction of electrostatic field near the engine nozzle can make the soot particles charge and orient away from the nozzle, solve the problem of carbon accumulation effectively. In order to study the electric charge law of soot particles, a linear tube type electric charge device with uniform discharge was used to experiment, and a numerical model was established to simulate the electrical charge process of the particles. The effects of discharge voltage, Corona radius, gas velocity and temperature on carbon particle mass ratio were obtained by experiment. Orthogonal analysis shows that the discharge voltage is the most important factor for the particle load ratio, The ion current generated by corona discharge can be enhanced by increasing discharge voltage, and the frequency of particles colliding with charged ions will be increased, which increase the particle mass ratio . In addition, the model established in this paper can accurately calculate the charge law of particles under the coupling conditions of flow field, electric field and other physical fields. The simulation result shows that due to the presence of charged particles, the distribution of potential in the charged reactor is changed, which affects the distribution of field strength and spatial charge density. The effect of charged particles on the electric field decreases with the increase of its own motion speed.