Axial Wind-Borne Electrostatic Spray Research

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Abstract

Axial wind-borne electrostatic spray is applied into practice. It could improve atomization and work efficiency. This paper analyzes the forces that act on the charged droplets, and the transport equations of charged droplets are established. The droplets movement velocity in the air flow and electric field could be obtained. Analyses these equations, we conclude that: 1) Droplets velocity is related to air velocity, electric field intensity, time and parameter $A_1 = 3\pi\mu_f df(Re)/m_P = 18\mu_f f(Re)/\rho_P d^2$, $A_2 = q/m_P$, and would attenuate with the time going; 2) A_1 is inverse ratio to droplets diameter. When the droplets diameter decreasing, v_P is faster close to v_f ; 3) The electric field force could make the droplets velocity bigger. When the electric field existing, the droplets follow characteristic is decreasing. On the base of theory analysis, the experimental research on axial wind-borne electrostatic spray is carried through. The charge characteristic droplets size and the relations of atomization flow field and high voltage are obtained. The test results indicate: axial wind-borne electrostatic spray is superior to non-electrostatic spray. Finally, sterilization by electrostatic spray is carried out, the sterilization efficiency is increased for 5%~20%.

Figure: Electrostatic spray devices

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