

Secondary Atomization of Electrostatically Charged Drops

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Abstract

An investigation was conducted into the secondary atomization of charged drops. It began by deriving a non-dimensional charge number, Q , which compares the disruptive electrostatic stresses to the consolidating surface tension stresses. A non-dimensional conductivity number, K , was also proposed to compare the rate of charge movement to other characteristic times. Experimental results are presented which cover the range of Q and K expected in practice. They reveal that charge has a minimal effect on both breakup morphology and breakup time. Rather aerodynamic forces dominate the process. Finally, an analysis of the charge distribution on a deformed drop is presented to explain the small differences observed in results from conductive and non-conductive drops.

Key words: electrostatic sprays, secondary atomization, charged drops

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