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Settling of particle-suspension drops at low to moderate Reynolds numbers

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Abstract

The evolution of suspension drops settling in a fluid at low to moderate Reynolds number (based on drop sizes) is investigated experimentally. With increasing Reynolds number, it is found that the shape of the drop changes more rapidly with traveling length before breakup decreases. Also, the aspect ratio of the drop at breaking up, and the number of secondary droplets after breaking up increase with the Reynolds number. Our findings are consistent with previous simulation studies. The evolution and breakup mechanisms of a settling suspension drop at low to moderate Reynolds number are different to those at creeping flow limit.

Keywords: suspension drop, particle cloud, settling

1. Introduction

Dispersion of particles in an unbounded body of fluid is of great interest for many industrial and natural processes, including particles sediment in river beds and industrial tailing discharges [1, 2]. A considerable amount of work has been done both experimentally and numerically on the motion of a cloud of spherical particles (or suspension drop) under gravity in an otherwise pure

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