URN etd-0407109-183711-872
Author H. W. Wang
Author's Email Address No Public.
Statistics This thesis had been viewed 57 times. Download 35 times.
Department
Year 2004
Semester 1
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Centrifugal acceleration and Tangential velocity effect on the collision of a droplet with a solid surface
Date of Defense 0000-00-00
Page Count 82

Keyword
Weber number
drop impact
solid surface
tangential speed
partial rebound
deposition
split deposition

Abstract
The experimental investigation utilizes a piezo-electric drop generator with various sizes of nozzle and rates of flow to generate a stable free-flying stream of water drops. The stream of drops is directed at an angle to collide with a rotating cylindrical Teflon-coated surface. The centrifugal acceleration, tangential speed, and normal speed can be changed individually by varying the speed of the drop. Therefore, their respective effects can be independently observed.
Three dimensionless control parameters have been taken into account : the ratio of centrifugal acceleration and gravity. the normal Weber number and the tangential Weber number. The outcomes of collision include partial rebound, deposition, and split deposition. The collision outcome was found to depend on the normal Weber number and the tangential Weber number, which represent the collision momentum in the normal and the tangential direction, respectively. The extent of influence of the centrifugal acceleration induced by the rotation was kept negligibly under 2% compared with the impact momentum change.
The experimental results show that the dimensionless excess spread area was found to be directly proportional to the tangential Weber number. Through careful measurements on the elongation of the liquid drop after impact, the impact regime boundaries are seen to be governed by the long and short axes of the elliptical-disk shape at the maximal spread. Partial rebound first changes to deposition when the long axis is 1.1 times the short axis; and then changes to split deposition when the long axis is 1.46 times the short axis.
Advisory Committee R. H. Chen - advisor

Files etd-0407109-183711-872-001.pdf

indicate access worldwide
Date of Submission 0000-00-00