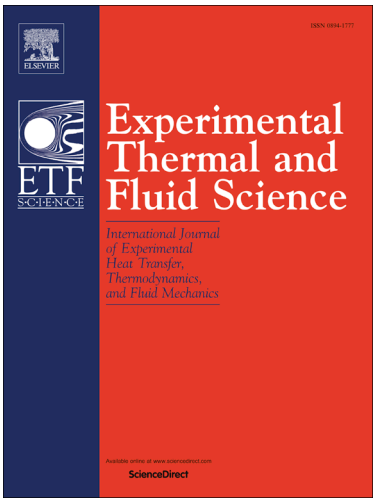

Drop impact on a small target with an inclined plane

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Drop impact on a small target with an inclined plane

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Abstract

A small target is an obstacle situated along the trajectory path of a moving drop, and when the drop hits it, a consequent noticeable reduction in the drop velocity occurs. In the present study we investigate the evolution of the velocity and the shape of a free falling drop impacting the upper disc-shape surface of an up-right cylindrical rod. Drops of water are created by a drop generator and some color is added to enhance visualization. The drops' impact and propagation were traced, using two high-speed cameras. The cameras were positioned to capture the side and top views of the drop impact. It is shown that the drops crawl downwards along the cylinder in a deccelerating manner while wetting and coating the rod surface. We use a small target with a divided impact surface to enable a simple visual comparison between the simultaneous impact outcomes on normal and on inclined surfaces. We show that while the combined target divides the drop into two portions, each portion continues to move independently from its counterpart in the same manner as on the undivided target. The experimental observations show that each portion is then split into two segments; one segment hits the target and the other misses it. Thereafter the two segments coalesce and crawl together downward. Off-center hitting has also been studied and analyzed by using an extended version of a simple energy conservation equation which was modified to take into account the target plane inclination.

Introduction

Over the last several decades, drop impact on solid and liquid surfaces have attracted much attention, and been extensively studied, as summarized in a number of reviews (Rein, 1993, Yarin, 2006, Josserand and Thoroddsen, 2016). The interest in drop impact studies focuses on the drop velocity and shape evolutions. The drop impactor interaction and the drop spread are