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Experimental investigation of a round jet impacting a disk engraved with radial grooves

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Abstract

The present work proposes to investigate the impact of a turbulent round jet on a disk. The disk diameter is one order of magnitude larger than the jet diameter but small enough to avoid the formation of a circular hydraulic jump. The case of a smooth disk is first studied as the reference case. We then report results obtained with a disk engraved along its circumference by a number N of radial grooves. The grooves are used to split the liquid sheet into multiple jets. According to the incoming flow rate Q and to the geometry of the groove, the number of jets n can be stable and corresponds to $2N$ jets and N jets, or variable, i.e. merged jets (mixed zone). Phase diagrams (Q,n) are deduced from measurements for different lengths of the groove. Finally, the obtained droplets are characterized in terms of diameters and velocities.

Keywords: groove, phase diagram, turbulent liquid sheets, turbulent atomisation of liquid sheets, jet numbers, droplet diameters, droplet velocities.

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