Abstract Submitted
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Studying gas-sheared liquid film in horizontal rectangular duct with LIF technique: droplets deposition and bubbles entrapment[1] ANDREY CHERDANTSEV, University of Nottingham, and Kutateladze Institute of Thermophysics, Russia, DAVID HANN, BARRY AZZOPARDI, University of Nottingham — High-speed laser-induced fluorescence technique is applied to study gas-sheared liquid film in horizontal rectangular duct (width 161 mm). Instantaneous distributions of film thickness over an area of 50*20 mm are obtained with frequency 10 kHz and spatial resolution 40 μm. The technique is also able to detect droplets entrained from film surface and gas bubbles entrapped by the liquid film. We focus on deposition of droplets onto film surface and dynamics of bubbles. Three scenarios of droplet impact are observed: 1) formation of a cavern, which is similar to well-known process of normal droplet impact onto still liquid surface; 2) "ploughing," when droplet is sinking over long distance; 3) "bouncing," when droplet survives the impact. The first scenario is often accompanied by entrainment of secondary droplets; the second by entrapment of air bubbles. Numerous impact events are quantitatively analyzed. Parameters of the impacting droplet, the film surface before the impact, the evolution of surface perturbation due to impact and the outcome of the impact (droplets or bubbles) are measured. Space-time trajectories of individual bubbles have also been obtained, including velocity, size and concentration inside the disturbance waves and in the base film region.

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