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Studying the instantaneous velocity field in gas-sheared liquid films in a horizontal duct JOAO VASQUES, University of Nottingham, MIKHAIL TOKAREV, ANDREY CHERDANTSEV, Kutateladze Institute of Thermophysics, Novosibirsk, Russia, DAVID HANN, BUDDHIKA HEWAKANDAMBY, BARRY AZZOPARDI, University of Nottingham — In annular flow, the experimental validation of the basic assumptions on the liquid velocity profile is vital for developing theoretical models of the flow. However, the study of local velocity of liquid in gas-sheared films has proven to be a challenging task due to the highly curved and disturbed moving interface of the phases, small scale of the area of interrogation, high velocity gradients and irregular character of the flow. This study reports on different optical configurations and interface-tracking methods employed in a horizontal duct in order to obtain high-resolution particle image velocimetry (PIV) data in such types of complex flows. The experimental envelope includes successful measurements in 2D and 3D waves regimes, up to the disturbance wave regime. Preliminary data show the presence of complex structures in the liquid phase, which includes re-circulation areas below the liquid interface due to the gas-shearing action, together with non-uniform transverse movements of the liquid phase close to the wall due to the presence of 3D waves at the interface. With the aid of the moving interface-tracking, PIV, time-resolved particle-tracking velocimetry and vorticity measurements were performed.

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