Abstract Submitted
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Dynamics of a rising bubble; Interactions between path, wake and shape oscillations[1] CHRISTIAN VELDHUIS, PETER VAN OOSTRUM, ARIE BIESHEUVEL, LEEN VAN WIJNGAARDEN, DETLEF LOHSE, University of Twente — Single bubbles rising in quiescent purified water have been studied experimentally in the equivalent diameter range 1-6 millimeters. High speed recordings (500-1000 fr/s), in a stereoscopic Schlieren setup, provide insight on bubble path, shape and wake. Past research has been mainly on small bubbles. In the current research the bubble size is increased such that shape oscillations set in. Our experiments give information on the onset of bubble shape oscillations and the different wake structures that occur as the bubble diameter increases. The well-known double-threaded wakes are observed for smaller bubbles, shape oscillations are not observed in this regime (D$\sim$2mm), bubbles are axi-symmetric. Somewhat larger bubbles (D$\sim$3mm) show specific vortex shedding frequencies, shape oscillations set in and axi-symmetry breaks. Even larger bubbles (D$\sim$4mm) have a turbulent wake where no specific frequencies can be detected. Interesting observations are made with respect to the coupling of shape oscillations and wake structure. It turns out that there are two basic shape oscillation modes in the intermediate regime (D$\sim$3mm). These shape oscillations can be linked with oscillations in bubble velocity and wake structure.

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