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High-speed microjet generation using laser-induced vapor bubbles NIKOLAI OUDALOV, YOSHIYUKI TAGAWA, IVO PETERS, CLAAS-WILLEM VISSER, DEVARAJ VAN DER MEER, ANDREA PROSPERETTI, CHAO SUN, DETLEF LOHSE, University of Twente — The generation and evolution of microjets are studied both experimentally and numerically. The jets are generated by focusing a laser pulse into a microscopic capillary tube ($\sim$50 μm) filled with water-based red dye. A vapor bubble is created instantly after shooting the laser ($<$1 μs), sending out a shockwave towards the curved free surface at which the high-speed microjet forms. The process of jet formation is captured using high-speed recordings at 1.0×10^6 fps. The velocity of the microjets can reach speeds of $\sim$850 m/s while maintaining a very sharp geometry. The high-speed recordings enable us to study the effect of several parameters on the jet velocity, e.g. the absorbed energy and the distance between the laser spot and the free surface.The results show a clear dependence on these variables, even for supersonic speeds. Comparisons with numerical simulations confirm the nature of these dependencies.

Nikolai Oudalov
University of Twente

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