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Microjet formation in a capillary by laser-induced cavitation IVO R. PETERS, YOSHIYUKI TAGAWA, DEVARAJ VAN DER MEER, ANDREA PROSPERETTI, CHAO SUN, DETLEF LOHSE, University of Twente, The Netherlands — A vapor bubble is created by focusing a laser pulse inside a capillary that is partially filled with water. Upon creation of the bubble, a shock wave travels through the capillary. When this shock wave meets the meniscus of the air-water interface, a thin jet is created that travels at very high speeds. A crucial ingredient for the creation of the jet is the shape of the meniscus, which is responsible for focusing the energy provided by the shock wave. We examine the formation of this jet numerically using a boundary integral method, where we prepare an initial interface at rest inside a tube with a diameter ranging from 50 to 500 μm. To simulate the effect of the bubble we then apply a short, strong pressure pulse, after which the jet forms. We investigate the influence of the shape of the meniscus, and pressure amplitude and duration on the jet formation. The jet shape and velocity obtained by the simulation compare well with experimental data, and provides good insight in the origin of the jet.

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