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Images of free surfaces of a liquid Li jet (simulating the IFMIF Li target) near the nozzle exit at velocities of (a)3 m/s, (b)7 m/s, and (c)13 m/s that were obtained in the Osaka University loop. We showed that free-surface appearances depend on the conditions of a nozzle-exit boundary layer. In addition, we measured amplitudes of free-surface fluctuations using contact- and non-contact-type methods, and revealed the free-surface characteristics of the IFMIF Li target. (Takuji KANEMURA *et al.*, Plasma and Fusion Research, Vol.11, 1405117 (2016) <http://www.jspf.or.jp/>)