

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Water entry of cylindrical bodies with various aspect ratios¹ NAY-OUNG KIM, HYUNGMIN PARK, Seoul National University — We experimentally investigate the water entry of cylindrical bodies with different aspect ratio (1.0-8.0), focusing on the deformation of free surface and resulting phenomena over and under the surface. The experiment is performed using a high-speed imaging (upto 10000 fps) and PIV. The head and tail of bodies are hemispherical and the nose part is additionally roughened with a sandpaper to see the effect of roughness as well. The release height is also adjusted to change the impact velocity at the free surface (Reynolds number is order of 10^5). For smooth surface (without cavity formation), a thin liquid film rises up the body after impacting, gathers at the pole and forms a jet over the free surfaces. The jet is created in the form of a thick and thin jet. The thin jet is produced by a water film riding up the surface of an object, and a thick jet is produced by rising water from underwater as the object sinks. However, as the aspect ratio increases, the liquid film does not fully ride up the body and cannot close, so there is an empty space below the free surface. With roughness (with cavity), the liquid film is detached from the body and splash/dome is formed above the free surface. The splash height and its collapsing time decrease with increasing the aspect ratio.

¹Supported by grants (MPSS-CG-2016-02, NRF-2017R1A4A1015523) of the Korea government.

Hyungmin Park
Seoul National University

Date submitted: 28 Jul 2017

Electronic form version 1.4