Abstract Submitted
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Jet formation from impulsive cavity collapse[1] ARNAUD ANTKOWIAK, IRPHÉ, Marseille, NICOLAS BREMOND, LCMD, ESPCI, Paris, STÉPHANE LE DIZÈS, EMMANUEL VILLERMAUX, IRPHÉ, Marseille — A cavity at a free liquid/gas interface collapsing due to an impulsive body force forms an intense concentrated jet. This is the paradigm for bubbles bursting at a liquid surface, the collapse of cavitation bubbles near a rigid boundary, collapsing voids following an impact, shaped charges, gravity waves colliding a dam, high amplitude Faraday waves, to quote a few examples among many. We address this problem by considering the axial impact of a cylindrical tube falling by gravity and filled with a liquid wetting the tube wall. Following the impact on a rigid floor, the curvature of the spherical meniscus initially fixed by the tube radius reverses violently, prelude of the birth of a rapid ascending jet. We derive the initial velocity and pressure field around the cavity just after the impact from Euler equations. They are insensitive to liquid viscosity and surface tension, consistently with detailed PIV measurements from high speed movies of the phenomenon. The extension to a cavity no more confined by rigid walls, the dynamics of the resulting jet and its final fragmentation will be considered as well.

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