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High-speed jet formation after solid object impact STEPHAN GEKLE, Physics of Fluids, University of Twente, The Netherlands, JOSE MANUEL GORDILLO, Area de Mecanica de Fluidos, Universidad de Sevilla, Spain, DEVARAJ VAN DER MEER, DETLEF LOHSE, Physics of Fluids, University of Twente, The Netherlands — A circular disc impacting on a water surface creates a remarkably vigorous jet. Upon impact an axisymmetric air cavity forms and eventually pinches off in a single point halfway down the cavity. Immediately after closure two fast sharp-pointed jets are observed shooting up- respectively downwards from the closure location, which by then has turned into a stagnation point surrounded by a locally hyperbolic flow pattern. This flow, however, is not the mechanism feeding the two jets. Using high-speed imaging and numerical simulations we show that jetting occurs as a consequence of the local flow around the base of the jet, which is forced by the colliding cavity walls. Based on this insight, we then show how the analytical description of a collapsing void (using a line of sinks along the axis of symmetry) can be continued beyond the time of pinch-off, namely by turning it into a discontinuous line plus a point sink located near the base of the jet. The model is in quantitative agreement with the numerical and experimental data.

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