Abstract Submitted
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Deformation of a liquid surface induced by an air jet ANDONG HE, ANDREW BELMONTE, Department of Mathematics, Penn State University — An experimental and theoretical study is performed to characterize the depression of a liquid surface due to an air jet exiting a nozzle from above. The Reynolds number of the jet is confined to a moderate range($\sim$100). In order to obtain more stable surface profiles, we use a viscous fluid (silicone oil) instead of water. Based on the data acquired from experiments, we find how the depth and diameter of the cavity are dependent on the radius and height of the nozzle, and the exit velocity of the jet. Theoretical explanations are provided both in the two dimensional (2-D) and three dimensional (3-D) cases. In the 2-D case, a free surface equation and the asymptotic expansion of its solution are obtained by employing a conformal mapping method. In the 3-D case where this technique fails, we propose a different model using an exact axisymmetric solution to Euler's equation.

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