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Transition to Absolute instability in a Liquid Sheet NATHANIEL BARLOW, BRIAN HELENBROOK, SUNG LIN, Clarkson University — A set of two simultaneous partial differential equations are derived which govern the spatio-temporal evolution of an initially local disturbance on a liquid sheet. Numerical solutions of these equations show how the absolute instability predicted by the spatio-temporal linear stability theory is approached when the Weber number is smaller than one. The results support the predictions of de Luca[1] and Lin and Jiang[2]. They showed that the disturbance in an absolutely unstable liquid sheet grows as fast as the cubic root of time as time approaches infinity. The temporal normal mode solution of Luchini [3] failed to capture this large time asymptotic behavior.

[1]L. de Luca and M. Costa. J. Fluid Mech. 331, 127, 1997.
[2]S.P. Lin and W. Y. Jiang. Phys. Fluids. 15, 1745, 2003.
[3]P. Luchini. Phys. Fluids, 16, 2154, 2004.

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