

Flow Studies of a Two-Dimensional Liquid Film Jet

M. Gharib and P. Derango

Citation: [The Physics of Fluids](#) **31**, 2389 (1988); doi: 10.1063/1.4738824

View online: <https://doi.org/10.1063/1.4738824>

View Table of Contents: <https://aip.scitation.org/toc/pfl/31/9>

Published by the [American Institute of Physics](#)

ARTICLES YOU MAY BE INTERESTED IN

[Instantaneous Two-Dimensional Velocity Field Measurements in a Periodic Flame Using Particle Tracking Velocimetry](#)

[The Physics of Fluids](#) **31**, 2388 (1988); <https://doi.org/10.1063/1.4738823>

[Views of the Transverse Jet near Field](#)

[The Physics of Fluids](#) **31**, 2390 (1988); <https://doi.org/10.1063/1.4738825>

[Vortex Asymmetry and Breakdown over a Slender Delta Wing—A Limit Cycle Flow Phenomenon](#)

[The Physics of Fluids](#) **31**, 2391 (1988); <https://doi.org/10.1063/1.4738826>

[Gallery of fluid motion](#)

[The Physics of Fluids](#) **31**, 2383 (1988); <https://doi.org/10.1063/1.866590>

[Self-Excited Oscillations and Mixing in a Hot Jet](#)

[The Physics of Fluids](#) **31**, 2386 (1988); <https://doi.org/10.1063/1.4738821>

[Cooling and Solidifying an Aqueous Solution at an Inclined Boundary](#)

[The Physics of Fluids](#) **31**, 2392 (1988); <https://doi.org/10.1063/1.4738827>

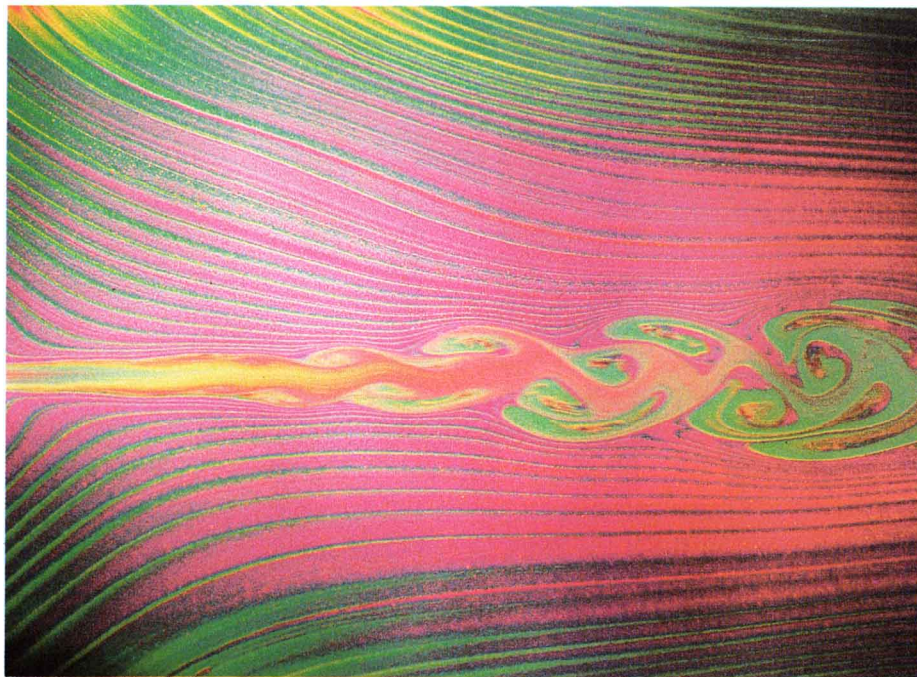


Figure 1

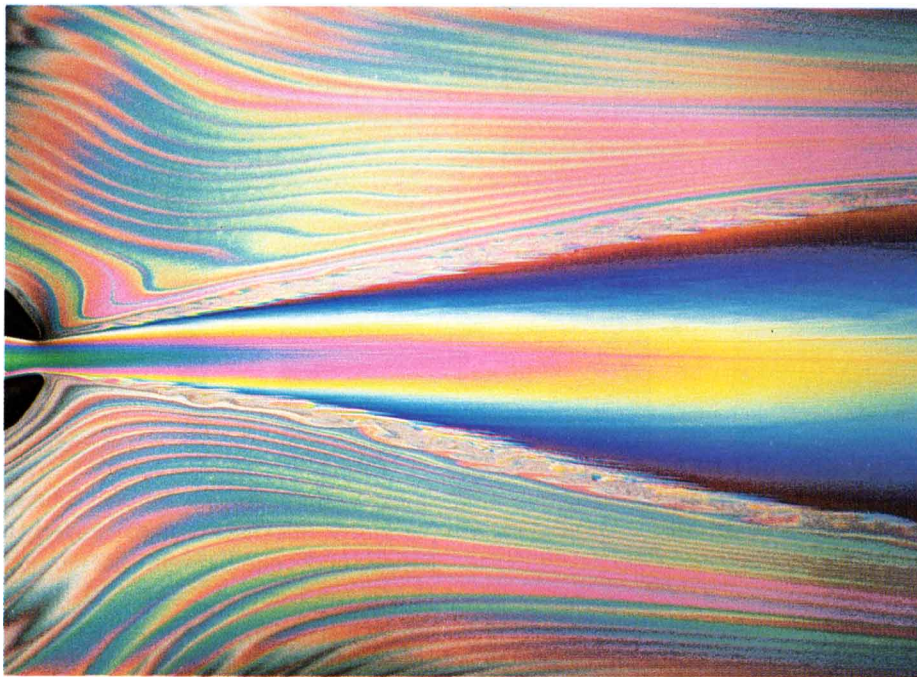


Figure 2

FLOW STUDIES OF A TWO-DIMENSIONAL LIQUID FILM JET

M. Gharib and P. Derango
(University of California, San Diego)

The above images represent a two-dimensional jet produced in a soap film tunnel. The tunnel consists of a frame in which one end is positioned in a diluted soap mixture and the other end is subjected to a film-pulling mechanism. In our device the pulling mechanism is provided through the contact action of a two-dimensional water jet. The two-dimensional jet of higher surface tension is directed at a small angle to the soap film surface at the downstream end of the tunnel. The pulling effect of the high momentum jet results in a

uniform two-dimensional motion of the suspended soap film in the frame. Once the two-dimensional flow of the thin film ($\sim 1 \mu$ thick) starts in the frame, various objects can be placed in the test segment of the frame to study their associated two-dimensional flow fields. By imposing certain geometries on the boundaries of the frame, various shear flows such as jets or two-dimensional mixing layers can be produced.

The interference colors in the above images represent isovelocity (isothickness) regions. The two-dimensional jet in Fig. 1 has a centerline velocity of 140 cm/sec with a corresponding Reynolds number of 2000. Figure 2 shows the same jet, but the jet fluid has a lower surface tension than the ambient fluid, which results in a large growth rate for the jet.