Linear and nonlinear stability of floating viscous sheets GILLES
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Paris 6 — The dynamics of thin viscous sheets is relevant to industrial processes
such as float glass and to natural processes such as plate tectonics. We study the
behavior of a thin, Newtonian viscous sheet undergoing stretching and bending.
We use asymtotic expansions to derive the equations governing the evolution of the
thickness and of profile of the sheet subjected to an external force field. Two models
are obtained according to the scaling of the characteristic evolution time. In this
framework, we investigate the stability of a viscous sheet floating on a denser fluid
[at rest], accounting for gravitation and surface tension.The various instable modes
are described. A nonlinear analysis yields the long-time evolution of the sheet. We
also discuss possible extensions to falling sheets or to variable viscosities.

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