**Wrinkling induced by poking a free-floating film under tension**[1]

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— We study experimentally
and theoretically the out-of-plane deformation in a floating polystyrene film induced
by depressing the centre of the film by a distance, d. When this depth exceeds a
critical value d_c, the smooth conical deformation of the film becomes unstable to
an elastic instability in which a radial wrinkling pattern develops. The wrinkles
have a finite length, and originate a finite radius from the centre. This observation
is completely reproduced by a calculation starting from the von Karman equations.
Experimental results and theoretical predictions for the critical depth as a function
of the thickness and elasticity of the films are in good agreement. We also present
theoretical results for the number and the length of the wrinkles, and the radius of
the cone of smooth deformation.

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