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Spreading of thin films assisted by thermal fluctuations BENNY DAVIDOVITCH, Harvard University, ESTEBAN MORO, Universidad Carlos III de Madrid, HOWARD STONE, Harvard University — We derive a nonlinear stochastic lubrication equation that describes the dynamics of a thin film on a solid substrate in the presence of thermal fluctuations. Numerical simulations followed by self-similarity analysis indicate that, asymptotically, when thermal fluctuations become dominant the radii $r(t)$ of spreading drops grow in time as $t^{1/4}, t^{1/6}$ in channel and radial flow geometries, respectively. These spreading rates are much faster than the classical Tanner's law, according to which $t^{1/7}, t^{1/10}$ in these flow geometries, respectively. In many fluids, thermal effects might be attenuated by gravitational or van der Waals forces. We propose, however, that in certain complex fluids, such as colloidal liquids, such enhanced rate of spreading drop might be observed.

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