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Asymptotics regimes in elastohydrodynamic and stochastic leveling on a viscous film[1] CHRISTIAN PEDERSEN, Department of Mathematics, University of Oslo, Oslo, Norway, JOHN NIVEN, Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada, THOMAS SALEZ, University of Bordeaux, CNRS, LOMA, Talence, France, KARI DALNOKI-VERESS, Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada, ANDREAS CARLSON, Department of Mathematics, University of Oslo, Oslo, Norway — We study the relaxation dynamics of an elastic plate resting on a thin viscous film that is supported by a solid substrate. By combining scaling analysis, numerical simulations and experiments, we identify asymptotic regimes for the elastohydrodynamic leveling of a surface perturbation when the flow is driven by either elastic bending of the plate or thermal fluctuations. In both cases we identify two distinct regimes when the perturbation height is either much larger or much smaller than the thickness of the pre-wetted viscous film. Our analysis reveals a distinct crossover between the similarity exponents with the ratio of the perturbation height to the film height.

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