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Competition between adhesion and inertia during stick-slip peeling of Pressure Sensitive Adhesives M.-J. DALBE, Laboratoire de Physique de l'ENS de Lyon, CNRS, Université de Lyon, France, R. VILLEY, Laboratoire FAST, CNRS, Université Paris-Sud, Orsay, France, M. CICCOTTI, Laboratoire PPMD/SIMM, CNRS, ESPCI Paristech, Paris, France, P.-P. CORTET, FAST, S. SANTUCCI, Laboratoire de Physique de l'ENS de Lyon, L. VANEL, Institut Lumière Matière, CNRS, Université de Lyon, France — We consider the classical problem of the instable stick-slip dynamics often observed when peeling a pressure sensitive adhesive, quantifying for the first time experimentally the influence of the peeling angle. This instability is known to be the consequence of a decreasing fracture energy of the adhesive-substrate joint over a certain range of driving velocity: we focus here on the important case where the instability develops at large driving velocity. We show that the shape of the peeling front velocity fluctuations progressively changes from typical stick-slip relaxation oscillations to nearly sinusoidal oscillations as the peeling angle and/or the driving velocity is increased. This transition is accompanied with a change in the dependencies of the limit cycles' period on the control parameters. We show that it results from the competition, in the dynamical equation, between the standard fracture energy and a term –considered here for the first time– associated to the freestanding tape elasticity and inertia. We manage to predict quantitatively the transition of the instability amplitude and period from the classical Barquins-Maugis quasistatic regime to a purely inertial regime in which the adhesion energy is no more at play in setting the instability limit cycles.

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