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Yanking a chain: Lift-off and snapping PIERRE-THOMAS BRUN, MIT, BASILE AUDOLY, UPMC / CNRS, ALAIN GORIELY, DOMINIC VELLA, University of Oxford — We revisit the first mechanics problem that everyone meets in high school: a chain on a frictionless pulley. Rather than considering the problem of a mass on at each end of the string, however, we suppose that one end is subject to a constant acceleration. This simple change has some dramatic consequences for the ensuing motion: the chain 'lifts off' from the pulley, the free end accelerates faster than the end that is being pulled and finally the chain undergoes a dramatic reversal of curvature reminiscent of the crack or snap of a whip. We present simple experiments, numerical simulations and theoretical arguments that explain some but not all of these phenomena.

Pierre-Thomas Brun
MIT

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