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Instability of an elastic knot under twist BASILE AUDOLY, CNRS / University Paris 6, NICOLAS CLAUVELIN, University Paris 6, SEBASTIEN NEUKIRCH, CNRS / University Paris 6, INSTITUT DE MECANIQUE D'ALEMBERT TEAM — In a recent paper, we derived a solution to the Kirchhoff equations representing a knotted elastic rod held by a tensile force applied at its ends. This problem has been formulated as the minimization of a curvature energy in the presence of a topological constraint. We extend this analysis to the case of a knot subjected to both a tensile force and a twisting moment. We unveil a striking instability that can be easily reproduced with a piece of computer cord: a simple knot, initially comprising a large loop merging with a localized braid, can be unfolded under applied twist into a symmetric shape resembling the figure of eight. Doing so, it becomes much easier to untie.

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