

Abstract Submitted
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Rotation of a Thin Elastic Rod Injected into a Cylindrical Constraint¹ CONNOR MULCAHY, Massachusetts Institute of Technology, TIANXIANG SU, NATHAN WICKS, JAHIR PABON, Schlumberger-Doll Research, PEDRO REIS, Massachusetts Institute of Technology — We report the results from an experimental investigation of the buckling of a thin elastic rod injected into a horizontal cylindrical constraint, with an emphasis on comparing the two cases of rotating, or not, the rod at the injection site. We are particularly interested on the total length of rod that can be injected into the pipe prior to the onset of helical buckling. This instability arises due to the frictional rod-constraint contact that eventually leads to the buildup of axial stress on the rod, above a critical value. We explore the dependence of the buckling conditions on the physical and control parameters of the system (e.g. material and geometric parameters, injection speed and rotation frequency) and rationalize the underlying physical mechanism through a reduced model.

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