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The asymptotic structure of a slender coiling fluid thread MAURICE BLOUNT, JOHN LISTER, University of Cambridge — The buckling of a viscous fluid thread as it falls through air onto a stationary surface is a well-known breakfast-time phenomenon which exhibits a rich variety of dynamical regimes [1]. Since the bending resistance of a slender thread is small, bending motion is largely confined to a short region of coiling near the surface. If the height of fall is large enough, then the thread above the coiling region forms a 'tail' that falls nearly vertically under gravity but is deflected slightly due to forces exerted on it by the coil. Although it is possible to use force balances in the coil to estimate scalings for the coiling frequency, we analyse the solution structure of the entire thread in the asymptotic limit of a very slender thread and thereby include the dynamic interaction between the coil and the tail. Quantitative predictions of the coiling frequency are obtained which demonstrate the existence of leading-order corrections to scalings previously derived. In particular, we show that in the regime where the deflection of the tail is governed by a balance between centrifugal acceleration, hoop stress and gravity, the tail behaves as a flexible circular pendulum that is forced by bending stress exerted by the coil. The amplitude of the response is calculated and the previously observed resonance when the coiling frequency coincides with one of the eigenfrequencies of a free flexible pendulum is thereby explained. [1] N.M. Ribe *et al.*, *J. Fluid Mech.* **555**, 275-297.

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