

Abstract Submitted
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Unraveling the chain fountain JOHN BIGGINS, MARK WARNER,
University of Cambridge — If a chain is initially at rest in a beaker at a height h_1 above the ground, and the end of the chain is pulled over the rim of the beaker and down towards the ground and then released, the chain will spontaneously “flow” out of the beaker under gravity. Furthermore, the beads do not simply drag over the edge of the beaker but form a fountain reaching a height h_2 above it. I will show that the formation of a fountain requires that the beads come into motion not only by being pulled upwards by the part of the chain immediately above the pile, but also by being pushed upwards by an unexpected reaction force from the pile of stationary chain. I will propose possible origins for this force, argue that its magnitude will be proportional to the square of the chain velocity, and predict and verify experimentally that $h_2 \propto h_1$. I will also discuss the case where the pot is tilted, and show, experimentally and theoretically, that the chain rises and falls in an inverted catenary, and discuss the appropriate boundary conditions at the ends of the chain.

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