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Fountain behaviour from the frequency of fountain-top fluctuation and rise height HENRY BURRIDGE, GARY HUNT, University of Cambridge — Focusing on the dynamics of established turbulent axisymmetric fountains in uniform quiescent environments, we present measurements for the frequency of fluctuations at the top of aqueous-saline fountains. Our results span source Froude numbers, $0.3 < Fr_0 < 40$, and clearly indicate four discrete bands of Fr_0 within which the dimensionless frequency of fluctuation is constant - the value of the constant changing between each band [Burridge & Hunt (2013), J. Fluid Mech. 728, 91-119]. Our independent measurements of rise height [Burridge & Hunt (2012),J. Fluid Mech. 691, 392-416] show that established fountains can be classified into four bands - within each, the mean rise height exhibits a unique dependence on Fr_0. Comparison of the Fr_0 bands show close agreement. This suggests that the dominant physics controlling the fountain's behaviour remains unchanged within each band and that monitoring the frequency of fluctuations at the fountain top provides a robust and independent means of classification. Within each class we identify unique time scales for the fluctuations and decompose these time scales into the relevant rise height and velocity scales, thereby demonstrating that the dominant length, time and velocity scales all change at the same Fr_0 boundaries.

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