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Solute transport by flow yields geometric shocks in shape evolution JINZI (MAC) HUANG, Courant Institute, NYU, MEGAN DAVIES WYKES, Courant Institute, NYU; DAMTP, University of Cambridge, GEORGE HAJJAR, LEIF RISTROPH, Courant Institute, NYU, MICHAEL SHELLEY, Courant Institute, NYU; Flatiron Institute, NYC — Geological processes such as erosion and dissolution of surfaces often lead to striking shapes with strikingly sharp features. We present observations of such features forming in dissolution under gravity. In our experiment, a dissolving body with initially smooth surface evolves into an increasingly sharp needle shape. A mathematical model of its shape dynamics, derived from a boundary layer theory, predicts that a geometric shock forms at the tip of dissolved body, with the tip curvature becoming infinite in finite time. We further discuss the model's application to similar processes, such as flow driven erosion which can yield corners.

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