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**A Riemann-Hilbert problem for the shape of a body dissolving in flow** NICK MOORE, Florida State University, JINZI MAC HUANG, LEIF RISTROPH, New York University, APPLIED MATH LAB, COURANT INSTITUTE TEAM — As is familiar to anyone who has stirred sugar into coffee, fluid flow can enhance the dissolution of solid material. This effect plays an important role in contexts as varied as landscape formation and drug delivery within the body, but such processes are not well understood due to the interaction between evolving surfaces and flow. By performing experiments with hard-candy bodies dissolving in fast flowing water, we find that different initial geometries converge to the same final shape as they vanish. By modeling both the separated flow around the body and the molecular diffusion of material within the boundary layer, we obtain a Riemann-Hilbert problem for the terminal shape. The solution predicts a front surface of nearly constant curvature, in agreement with experimental measurements. Once formed, this geometry dissolves self-similarly in time and vanishes with a power-law predicted by the model.

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