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Stochastic Rounding of Rocks and Universal Scaling DONALD PRIOUR, Youngstown State University — To probe how (and whether) initially irregular rocks become round we consider three dimensional convex stones subject to a stochastic weathering process with randomly oriented planes cumulatively removing material to mimic the erosion of rock due to collisions among stones. We find convergence to round shapes as evidenced by a systematic decrease of quantitative measures of deviations from perfectly spherical shapes. The rounding of initially angular forms occurs whether polyhedra are initially symmetric cube shapes, or irregular geometries formed by fragmenting a cube into many jagged fragments. Other more detailed gauges of departures from perfectly round shapes, such as global measures of prolateness and oblateness, also ultimately converge, albeit with the latter rising to a maximum before decaying to zero. The rounding process is governed by an acceptance probability for the area of prospective slices such that the relative mean area of new facets decreases with decreasing mass of the stone, enforcing the emergence of smooth shapes as material is carved away; we consider stones with as many as 2,500 facets. As a function of mass, we find universal dependences of observables which are independent of the scheduling of the reduction of the area of successive facets.

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