

Abstract Submitted
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Surface Design Based on Discrete Conformal Transformations

CARLOS DUQUE, CHRISTIAN SANTANGELO, University of Massachusetts Amherst, ETIENNE VOUGA, University of Texas at Austin — Conformal transformations are angle-preserving maps from one domain to another. Although angles are preserved, the lengths between arbitrary points are not generally conserved. As a consequence there is always a given amount of distortion associated to any conformal map. Different uses of such transformations can be found in various fields, but have been used by us to program non-uniformly swellable gel sheets to buckle into prescribed three dimensional shapes. In this work we apply circle packings as a kind of discrete conformal map in order to find conformal maps from the sphere to the plane that can be used as nearly uniform swelling patterns to program non-Euclidean sheets to buckle into spheres. We explore the possibility of tuning the area distortion to fit the experimental range of minimum and maximum swelling by modifying the boundary of the planar domain through the introduction of different cutting schemes.

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