Fast conformal mapping via computational and hyperbolic geometry

by

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 The conformal map from the unit disk to the interior of a polygon P is given by the Schwarz-Christoffel formula, but this is stated in terms of parameters that are hard to compute from P. After some background and motivation, I explain how the medial axis of a domain, a concept from computational geometry, can be used to give a fast approximation to these parameters, with bounds on the accuracy that are independent of P. The precise statement involves quasiconformal mappings, and proving these bounds uses a result about hyperbolic convex sets originating in Thurston's work on 3-manifolds. If time permits, I will mention some applications to optimal meshing and triangulation of planar polygons.