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**Christine Hoffman** (choffman7@ucmerced.edu), 5200 North Lake Rd., Merced, CA 95348, and **Boaz Ilan\***, 5200 North Lake Rd., Merced, CA 95348. *Derivative-free shape optimization and uncertainty quantification in nonimaging optics.*

We present a computational framework for optimizing the shape of optical nonimaging concentrators. The concentrator's mirror is described by a polygon, whose vertices are optimized to maximize the light collected by an absorber. The device is modeled using vectorized ray tracing. This optimization problem is tricky, because the objective function can be almost flat, but also sensitive to corners. We utilize pattern search with a convexity constraint. Computational results show the efficacy of this approach, which avoids getting trapped in undesired local minima. Uncertainty quantification reveals that smoother shapes, which are closer to the ideal, are also more sensitive to manufacturing noise. This approach has application to solar/thermal concentrators and illumination engineering. (Received January 29, 2019)