Numerical Solution of Soap Film Dual Problems

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Abstract

The soap film problem is to minimize area, and its dual is to maximize the flux of a divergenceless bounded vectorfield. This paper discretizes the continuous problem and solves it numerically. This gives upper and lower bounds on the area of the globally minimizing film. In favorable cases, the method can be used to discover previously unknown films. No initial assumptions about the topology of the film are needed. The paired calibration or covering space model of soap films is used to enable representation of films with singularities.