Computing Discrete Minimal Surfaces and Their Conjugates

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Abstract

We present a new algorithm to compute stable discrete minimal surfaces bounded by a number of fixed or free boundary curves in $\mathbb{R}^3$, S^3 and $\mathbb{H}^3$. The algorithm makes no restriction on the genus and can handle singular triangulations.

Additionally, we present an algorithm that, starting from a discrete harmonic map, gives a conjugate harmonic map. This can be applied to the identity map on a minimal surface to produce its conjugate minimal surface, a procedure that often yields unstable solutions to a free boundary value problem for minimal surfaces. Symmetry properties of boundary curves are respected during conjugation.