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# A self-avoiding approximate mean curvature flow

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## Abstract

The starting point for this work is the following observation: there exists a phase field approximation of the Willmore flow that seems to prevent, at least numerically, the appearance of self-intersections. Recall that the phase field approximation method allows to approximate the singular energy of singular functions by smooth energies of smooth functions.

In a collaboration with Elie Bretin (INSA Lyon, France) and Chih-Kang Huang (Claude Bernard University Lyon 1, France), we studied the "active principle" of this approximation prohibiting self-intersections. We deduced a simple term which, added to the approximate mean curvature flow, acts as a dynamic obstacle that guarantees self-avoidance.

I will describe some theoretical properties of this term and a numerical scheme for the associated self-avoiding approximate mean curvature flow. I will also show applications to Steiner's problem and Plateau's problem.

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