

Relaxation of a generalized Willmore functional

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Several shape optimization problems, e.g. in image processing, biology, or discrete geometry, involve the Willmore functional, which is for a surface the integrated squared mean curvature.

Due to its singularity, minimizing this functional under constraints is a delicate issue. More precisely, it is difficult to characterize precisely the structure of the minimizers and to give an explicit formula of their energy. In a joint work with Giacomo Nardi (Paris-Dauphine) we have studied an "integrated" version of the Willmore functional, i.e. a version defined for functions and not only for sets.

In this talk, I will describe the tools, based on Young measures and varifolds, that we have introduced to address the relaxation issue. I will also present some connections with the phase-field numerical

approximation of the Willmore flow, that we have investigated with Elie Bretin (Lyon) and Edouard Oudet (Grenoble)