

# p-Willmore Energies

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## ABSTRACT

This is a presentation on p-Willmore energies in space forms, from a variational viewpoint. It discusses the first and second variation associated to this type of energy, and some new theoretical results regarding optimizations. It also presents a finite-element formulation of p-Willmore type flow for closed (possibly self-intersecting) surfaces immersed in  $R^3$ , which is amenable to geometric constraints on both surface area and enclosed volume. Inspired by conformal geometry, a post-processing procedure is also presented which ensures that a given surface mesh remains nearly conformal along the Willmore flow. This abolishes the mesh degeneration that usually accompanies position-based surface flows, leading us to a robust computational model.