

# IGA METHOD FOR GEOMETRIC EQUATIONS

ANÍBAL CHICCO RUIZ, EDUARDO M. GARAU, AND M. SEBASTIAN PAULETTI

ABSTRACT. In this talk we consider different IGA schemes for the approximation of geometric equations. The driving problem is the minimization of some geometric energy such as the area or the Willmore functional of some surface.

We study the performance of two different spline based discrete methods to find the minimizer in the case of minimal surface and Willmore surface. One is a gradient flow method based on [1] but adapted to splines and the other is a quasi Newton method [2]. We present numerical experiments using the package GeoPDEs [3].

**Keywords:** IGA, MCF, Willmore, Gradient Flow, Newton

## REFERENCES

- [1] Bonito, Andrea; Nochetto, Ricardo H.; Pauletti, M. Sebastian. Parametric FEM for geometric biomembranes. *J. Comput. Phys.* 229 (2010), no. 9, 3171–3188.
- [2] Chicco Ruiz, Anibal; Morin, Pedro; Pauletti, M. Sebastian. The shape derivative of the Gauss curvature. arXiv:1708.07440 [math.OC]
- [3] Vázquez, R. A new design for the implementation of isogeometric analysis in Octave and Matlab: GeoPDEs 3.0. *Comput. Math. Appl.* 72 (2016), no. 3, 523–554.

FACULTAD DE INGENIERIA QUIMICA (UNIVERSIDAD NACIONAL DEL LITORAL - CONSEJO NACIONAL DE INVESTIGACIONES CIENTIFICAS Y TÉCNICAS)

*E-mail address:* `achicco@santafe-conicet.gov.ar`

FACULTAD DE INGENIERIA QUIMICA (UNIVERSIDAD NACIONAL DEL LITORAL - CONSEJO NACIONAL DE INVESTIGACIONES CIENTIFICAS Y TÉCNICAS)

*E-mail address:* `egarau@santafe-conicet.gov.ar`

FACULTAD DE INGENIERIA QUIMICA (UNIVERSIDAD NACIONAL DEL LITORAL - CONSEJO NACIONAL DE INVESTIGACIONES CIENTIFICAS Y TÉCNICAS)

*E-mail address:* `spauletti@fiq.unl.edu.ar`