On the singular set of energy minimising bendings

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A piece of paper that has been bent can be modeled as follows. A bounded simply connected domain $S \subset \mathbb{R}^2$ models the piece of paper in its reference configuration, before any bending has been applied to it. The possible shapes obtained after bending are $W^{2,2}$-isometric immersions from S to $\mathbb{R}^3$. The isometry constraint reflects our intuition that local distances between points along the piece of paper remain unchanged by bendings.

It is well-known that flat surfaces, i.e. the possible shapes that a piece a paper has after bending, are developable. Further, the deformations minimising Kirchhoff's nonlinear bending energy (or Willmore energy) are known to satisfy a partial regularity result. In the talk, we present some results on the geometry of the main part of the singular set, i.e. of the planar regions in the deformed configuration.

References

[1] A. Dall'Acqua, P. Hornung, Structural Results about the Singular Set of Energy Minimizing Bendings. Submitted.

[2] P. Hornung, *Euler-Lagrange equation and regularity for flat minimizers of the Willmore functional. Comm. Pure Appl. Math.* 64, 2011, 367–441.