A geometrically nonlinear Cosserat model for micro-polar elastic solids –

Regularity questions and singular solutions

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Abstract

Since the beginning of the 1900s, linearized Cosserat elasticity is well known and often used in the engineering community for modeling micro-polar elastic solids. But from a mathematician's perspective a geometrically nonlinear version of such models is interesting. Existence of solutions for the latter has been known for about 20 years, while regularity questions were first investigated only during the last four years.

In the first half of the talk, we will get an introduction to the model itself as well as an overview over recently developed different regularity results for Cosserat energy minimizers and critical points (i.e. weak solutions of the Euler-Lagrange equations). We will see, how classical regularity theory for harmonic maps into manifolds is an essential tool in deriving those results.

At the same time, the geometric nature of the model's nonlinearity allows not only regular (Hölder continuous) but also quite singular solutions to exist, which we will focus on in the second half of the talk.

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