KNOT-ENERGIES AND FRACTIONAL HARMONIC MAPS

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We will present a proof that curves (knots) which are stationary for the Moebius energy are smooth in the critical dimension. This energy was introduced by O'Hara (Topology, 30(2):241–247, 1991), and it was shown by Freedman, He and Wang (Ann. of Math. (2), 139(1):1–50, 1994), and He (Comm. Pure Appl. Math., 53(4):399–431, 2000) that minimizers of this energy are smooth, using a geometric argument employing crucially the Moebius invariance of this energy.

Our approach, however, which shows regularity even for critical points, does not rely on this geometric invariance, but rather uses analytic methods from Harmonic Analysis and Potential Theory inspired by the regularity arguments of fractional harmonic maps by Da Lio-Riviere (APDE, 4(1):149–190, 2011; Advances in Mathematics, 227:1300–1348, 2011), and S. (J. Differential Equations, 252:1862–1911, 2012; Preprint, arXiv:1103.5203, 2011).

(joint work with S. Blatt, P. Reiter)