

Existence and compactness for a singular mean field problem with sign changing potentials

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Abstract. In this talk, we study the existence of solutions of the following mean field problem

$$-\Delta_g u = \lambda \left(\frac{K e^u}{\int_{\Sigma} K e^u} - \frac{1}{|\Sigma|} \right) - 4\pi \sum_{i=1}^m \left(\alpha_i \delta_{p_i} - \frac{1}{|\Sigma|} \right) \text{ in } \Sigma, \quad (1)$$

where Σ is a compact surface without boundary, equipped with a certain Riemannian metric g . Here Δ_g is the Laplace-Beltrami operator, λ is a positive parameter, $|\Sigma|$ denotes the area of Σ and K is a given function defined in Σ . Mean field problems of Liouville-type arise in differential geometry and physics

Following the ideas of [3], the solvability of this and other related problems has been settled under the assumption of K positive. We will focus on the case in which K is allowed to change sign. Under extra hypotheses on K , existence results are obtained by means of variational methods. In addition, we present a compactness criterion for solutions, see [1, 2].

Referencias

- [1] F. De Marchis, R. López-Soriano. *Existence and Non Existence Results for the singular Nirenberg problem*. Calc. Var. Partial Differential Equations, **55** (2016), no. 2, Art. 36, 35 pp.
- [2] F. De Marchis, R. López-Soriano, D. Ruiz. *Compactness, existence and multiplicity for the singular mean field problem with sign-changing potentials*. preprint (2016), arXiv:1612.02080.
- [3] Z. Djadli, A. Malchiodi. *Existence of conformal metrics with constant Q-curvature*. Ann. of Math. **168** (2008), no. 3, 813–858.

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