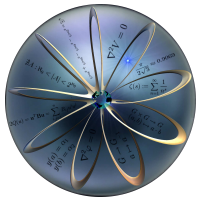

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round complexity

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Mimicking the Lusternik-Schnirelmann category invariant for a smooth manifold M we can ask about the minimal number of critical loops of smooth scalar maps $M \to \mathbb{R}$ which are round functions, that is functions whose critical points are aligned in a disjoint union of closed curves (a link).

This number is called the **round complexity** of M and it is symbolized as $\mathrm{roc}(M)$

Then

$$\mathrm{roc}(M) = \min \#\{\text{critical loops of} \quad f \quad | \quad f\colon M \to \mathbb{R} \quad \text{is round function}\}$$

This concept is related to the invariant called t-cat.

Theorem 1: *The round complexity for the 2-torus and the Klein bottle is two; all the other closed surfaces have a round complexity of three.*

Theorem 2: *For each closed manifold,* $t - cat \leq roc$

Bibliography

D. Siersma, G. Khimshiasvili, On minimal round functions, Preprint 1118, Department of Mathematics, Utrecht University, 1999, pp. 18.