Multiplicity of fixed points and growth of ε-neighborhoods of orbits

(Talk)

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(joint work with Pavao Mardešić and Maja Resman)

We study the relationship between the multiplicity of a fixed point of a function g, and the dependence on ε of the length of ε-neighborhood of any orbit of g, tending to the fixed point. The relationship between these two notions was discovered in [1] in the differentiable case, and related to the box dimension of the orbit.

Here, we generalize these results to non-differentiable cases. We study the space of functions having a development in a Chebyshev scale and use multiplicity with respect to this space of functions. Introducing a new notion of critical Minkowski order, we recover the relationship between multiplicity of fixed points and the dependence on ε of the length of ε-neighborhoods of orbits in non-differentiable cases where results from [1] do not apply.

Applications include in particular Poincaré map near homoclinic loop and Abelian integrals.

MSC2010: 37G15, 34C05.

Keywords: limit cycles, multiplicity, cyclicity, Chebyshev scale, critical Minkowski order, box dimension, homoclinic loop.

References

[1] N. Elezović, D. Žubrinić, V. Županović, Box dimension of trajectories of some discrete dynamical systems, Chaos Solitons Fractals, Vol 34(2) (2007), 244-252.

[2] P. Mardešić, M. Resman, V. Županović, Multiplicity of fixed points and growth of ε-neighborhoods of orbits, preprint

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