

Periodic Solutions of Hamiltonian Systems with Symmetries

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Abstract

The aim of this talk is to show the results concerning global bifurcation of periodic solutions for autonomous Hamiltonian and Newtonian systems. We consider also the situation when the potential has additional symmetries of some compact Lie group. Such results allow to generalize the classical Lyapunov center theorem to the case of symmetric systems.

The main tool that we use is the degree theory for equivariant gradient maps. For the problem with symmetries of some compact Lie group G , this invariant takes values in the Euler ring of G . Due to the sophisticated structure of this ring, using our tool we are able to prove global bifurcation also in the case, when the classical methods cannot be applied.

References

- [1] A. Gołębiewska, S. Rybicki: Generalization of Lyapunov center theorem for Hamiltonian systems via normal forms theory, *Journal of Differential Equations*, 421 (2025), 241–263.
- [2] A. Gołębiewska, S. Rybicki, P. Stefaniak: Periodic solutions of autonomous S^1 -symmetric Newtonian systems, [arXiv:2510.16073](#)