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(joint work with Elena A. Kudryavtseva)

Topological analysis of magnetic geodesic flow problem

In the talk the "magnetic geodesic problem" on 2-dimensional sphere will be discussed. Consider a charged material point moving on a surface of revolution under the action of axial-symmetric magnetic field. Fixing two poles which are fixed points of the S^1-action and introducing geodesic coordinates (r, φ) one can show that the Riemannian metric can be written in the form $ds^2 = dr^2 + f^2(r)\, d\varphi^2$. The Hamilton function of the problem remains the same as in the usual geodesic flow:

$$H = \frac{p_r^2}{2} + \frac{p_\varphi^2}{2f^2(r)},$$

but the symplectic structure is twisted:

$$\omega = dp_r \wedge dr + dp_\varphi \wedge d\varphi + \beta,$$

where $\beta = \Lambda'(r)\, dr \wedge d\varphi$ is a magnetic field form.

Review of the results:

(1) bifurcation diagram and bifurcation complex of this problem;

(2) full description of singularities of ranks 0 and 1;

(3) bifurcations of Liouville tori;

(4) invariants of Liouville equivalence.

SCIENTIFIC SEMINAR
"DIFFERENTIAL GEOMETRY AND APPLICATIONS"

headed by Academician of RAS Anatoly T. Fomenko

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