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*Topology of Liouville foliations of Kovalevskaya
system analogs on Lie algebras*

A well-known integrable system of rigid body dynamics discovered by S. Kovalevskaya can be considered as a dynamical system on a Lie algebra $e(3)$. Phase topology of this system was described by M.Kharlamov. Topological invariants of Liouville foliations describing closures of trajectories of the system on 3-dimensional regular levels Q^3 of energy and Casimir functions (all singularities on such Q^3 have the Morse–Bott type) were computed by A.Bolsinov, P.Richter and A.Fomenko.

The presentation is devoted to recent results on this system and its integrable analogs on other Lie algebras, i.e. $so(3, 1)$, $so(4)$ and $e(2, 1)$.

- (1) In the case of Lie algebra $so(4)$ the speaker computed Fomenko–Zieschang invariants for every regular 3-dimensional common level submanifold Q^3 of energy and Casimir functions of the system (bifurcation diagrams and non-degenerate singularities were computed earlier by I.Kozlov).
- (2) In the case of Lie algebra $so(3, 1)$ bifurcation diagrams (for zero area integral case) and Fomenko–Zieschang invariants for every regular Q^3 of the system were computed (earlier M.Kharlamov, P.Ryabov and A.Savushkin studied Sokolov integrable system closely related to this system: bifurcation diagrams, singularity types and Fomenko invariants were described).
- (3) For the pseudo-Euclidean analog of the Kovalevskaya system the speaker proved criterion of compactness of common level surface of four first integrals of the system (for the whole pencil of Lie algebras that include Lie algebra $e(2, 1)$) and shew the existence of non-compact singularities.
- (4) For the initial Kovalevskaya system we studied degenerate singularities of the rank 1 in the pre-image of cusps of bifurcation diagram. It was shown (joint with E.Kudryavtseva) that these singularities of Liouville foliation and only they have the cuspidal type (in the sense of A.Bolsinov, L.Guglielmi and E.Kudryavtseva) and thus are structurally stable.

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