1970

1970-1. Construct versal unfoldings of endomorphisms (of vector spaces and groups).

1970-2. Is the problem of distinguishing a center from a focus algebraically trivial? What about the general problem of the algebraic classification of the equilibrium points of a system of ordinary differential equations $\dot{x} = v(x)$ in $\mathbb{R}^n$?

1970-3. Investigate the connection between the rotation numbers of a Hamiltonian system and the property that the Hamiltonian is single-valued.

1970-4. Carry over Poincaré's Last Theorem about an annulus (and its conjectural generalizations) to the case of multi-valued Hamiltonians.

1970-5. Study the Diophantine approximations on generic submanifolds (and the bifurcations in k-parameter families).

1970-6. Explore the equations in variations along a stationary solution of the Euler hydrodynamic equation (for example, the existence of conjugate points), in particular, for the Kolmogorov flow and for the flow on the torus with the stream function $\sin y$.

1970-7. Compute the curvatures of the groups $\mathrm{SDiff}(S^2)$ and $\mathrm{SDiff}(\mathbb{T}^3)$.

1970-8. Investigate the birth of discrete spectrum at the point of maximum speed, from the viewpoint of genericity: non-degenerate case, bifurcations, etc. (in particular, for flows on the torus with the stream function f at the critical points of the function $v = f'$).

1970-9. Investigate the inertia indices of the stationary points of the kinetic energy on an orbit of the co-adjoint representation (from the viewpoint of bifurcations and genericity!).

1970-10. Prove that a divergence-free vector field on S^2 has at least two zeros. Prove an analogous statement for the mappings $S^2 \to S^2$ preserving oriented area (verify beforehand that the index of a fixed point of an area- and orientation preserving diffeomorphism of a plane does not exceed 1).

1970-11. What can one say about $\pi_2(\mathbb{C}P^n \setminus V)$, where V is a generic hypersurface of degree m?

1970-12. Evaluate the fundamental groups and the homologies of the spaces of curves with the simplest singularities that split completely into lines in $\mathbb{C}P^2$ (the spaces of surfaces that split into planes in $\mathbb{C}P^3$, etc.).

1970-13. Evaluate the topological invariants of the manifold of nonsingular cubic curves in $\mathbb{C}P^2$.

1970-14. Evaluate the fundamental group of the space of embeddings of a circle into a solid torus (the answer is a knot invariant!).

1970-15. Investigate topological properties of the stratification of the space of meromorphic functions on a Riemann surface (rational functions in the case of S^2).

1970-16. Is the problem of Lyapunov stability of an equilibrium of the system $\dot{x} = v(x)$, $x \in \mathbb{R}^n$ algebraically trivial? What about the problem of asymptotic stability? Does there exist an analytic Lyapunov function for this system?