Ideas for Kursovaya rabota
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1. Stability analysis of the Kowalevski top

Stability analysis is an important aspect of modelling physical systems, and solutions of such models. Essentially :
- an unstable system cannot be observed in nature, so cannot even be said to exist; in other words it is a meaningless model
- analogously, a physical process corresponding to a solution to a model (typically a set of differential equations) cannot be observed in nature if that solution is not stable, so again it will be meaningless unless it is stable.

Recently an approach to stability analysis of bi-hamiltonian systems was invented by Bolsinov and then significantly developed by Izosimov. I suggest that it could be an interesting project to study their construction and to apply to an example. As far as I know the stability analysis of the Kowalevski top is an untreated subject, and as it is an important "classical system", it could surely be of some interest.

This project would require a study of Hamiltonian systems, of stability and of integrability and bihamiltonian structures. Each of these elements will require separate work.

2. Hamiltonian reduction

Symmetry reduction is an important tool in Physics. This is especially interesting when it is applied to Hamiltonian models, when the symmetries preserve the Hamiltonian structure. I suggest a somewhat open-ended project requiring the development of a familiarity with Hamiltonian systems, and then of an appreciation of the basic principles of symmetry reduction. What follows could be anything from a discussion of some well-known integrable models, to participation in original research depending on the taste of the student, and on the amount of effort invested.