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Bifurcations of Liouville Tori for Goryachev-Chaplygin system Vs. Poincare system.

This is a research built upon special, integrable cases of rigid body motion. The differential equations of motion of such systems are Integrable Hamiltonian ones. The Goryachev-Chaplygin case is the focus of our interest. This system is completely integrable and the common level set of the first integrals H and F is a smooth manifold that is invariant under the phase flow of the system. Also, we know every connected component of the common level set (symplectic leave) is diffeomorphic to a two-dimensional torus . The bifurcation diagram of such completely integrable system is the region of possible motion on the plane of fi rst integrals together with the image of the critical set. In the case of Goryachev-Chaplygin top, one of the connected components on the integral manifold is an ordinary Liouville torus and lacks any critical points. To overcome this issue, using Andoyer variables, the invariant tori are constructed and singular leaves stability behavior are analyzed and compared to the traditional stability analysis using a parameter. Poincare's system models motion of a rigid body filled with viscous fluid and bifurcations of Liouville tori are constructed for this case. This model is a good approximation of motion of the earth. (Received September 26, 2017)