

Research and Numerical Simulation of the Euler Top

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Classical tops, such as the Euler, Lagrange, and Kovalevskaya tops, are important examples of rigid body systems in classical mechanics which can serve as useful test cases for numerical simulations, since they preserve several quantities such as energy, the magnitude of angular momentum, and additional integrals of motion. Although the Euler top seems to be the simplest case, it already exhibits interesting phenomena, for example the Dzhanibekov effect. The phase space of the Euler top can be parameterized by three components of angular momentum. Its rotational symmetry is related to the group $SO(3)$, and its equations of motion can be derived from the Lie–Poisson bracket. The Euler top is an example of Nambu dynamics where, as opposed to conventional Hamiltonian dynamics, two “Hamiltonians” are used instead of one.

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