

On the attitude dynamics of perturbed triaxial rigid bodies

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Attitude dynamics of perturbed triaxial rigid bodies is a rather involved problem, due to the presence of elliptic functions even in the Euler equations for the free rotation of a triaxial rigid body.

We revisited the Euler-Poinsot problem, and present several sets of canonical variables as well as its integration. With the solution of this problem, that will be taken as the unperturbed part, we expand the perturbation in Fourier series, which coefficients are polynomials of the Jacobian nome. These series converge very fast, and thus, with only few terms a good approximation is obtained. Once the expansion is performed, it is possible to apply to it a Lie-transformation. Several application to artificial and natural bodies have been carried out.

With the solution of the unperturbed problem, other aspects, like transversal homoclinic orbits and stochasticity bands are also considered.