Forschergruppe 877

TKM-/FOR 877-Seminar

Am Mittwoch, dem 12.02.2014 um 14:00 Uhr spricht

Prof. Dr. Michael Wilkinson
(Open University)

über

Random Tumbling

There is a vast literature on how small objects undergo diffusion when subjected to random forcing, but much less has been written about how an object rotates due to a random torque. There is a dimensionless parameter characterising this problem: the persistence angle β is the typical angle of rotation during the correlation time of the angular velocity. When β is small, the problem is simply diffusion on a sphere. But little is known about models with finite β, describing smooth random motion on a sphere.

I will discuss the formulation and solution of the simplest model, which is a spherical Ornstein-Uhlenbech process. In two dimensions (circular motion) this is exactly solvable. When β is large, the solution has a surprising property, which is analogous to the phenomenon of 'superoscillations'. In three dimensions we obtain asymptotic solutions for large β which involve a solving a radial Schrödinger equation where the angular momentum quantum number j takes non-integer values. The case where $j = (\sqrt{17} - 1)/2$ turns out to be of particular significance. As well as discussing random tumbling of a single body, I will also mention some results on the singularities of orientation vector fields of small bodies advected in random flows.

This talk reports joint work with Alain Pumir (ENS, Lyon) and Vlad Bezuglyy (Open University).

Ort: ITP, Brüderstraße 16, SR 210

Interessenten sind herzlich eingeladen!

gez. Prof. K. Kroy