Fakultät für Mathematik

universität wien

Mathematisches Kolloquium

EINLADUNG

Prof. Dr. David G. Ebin

(Stony Brook University)

“Constraining forces and a problem in fluid motion”

“Constraining forces and a problem in fluid motion”

Abstract: *Several problems in mechanics can be understood as motion near a submanifold of a configuration space. In such cases one might be given a manifold with a Riemannian metric, a submanifold and a function whose minimum is the submanifold. One then considers possible motions whose kinetic energy is given by the metric and whose potential energy is given by the function. Such motions will oscillate about the submanifold.*
We shall begin by analyzing a simple motion in R^2 whose submanifold is the circle and whose potential energy is k times the square of the distance to the circle, where k is a large positive constant. We will see that the motion oscillates about the circle with a frequency \sqrt(k) and amplitude 1/k so as k goes to infinity, the motion is constrained to the circle. Then we shall look at incompressible inviscid fluid motion with free boundary in a domain \Omega included in R^3. Here the configuration space will be all volume preserving maps of \Omega into R^3 and the submanifold D will be volume preserving diffeomorphisms of \Omega. The potential energy function V(\eta) will be k times the area of the boundary of \eta(\Omega) where k again is a large positive constant. The motion determined by this is incompressible fluid motion with surface tension proportional to k. We shall derive the equations of the motion and show that if the the boundary of \Omega has constant mean curvature (and is therefore a sphere), then as k gets large the motion converges to a curve in D; that is, as k goes to infinity the motion converges to a motion with fixed boundary.

Zeit: Mittwoch 21. Januar 2015
15.45 Uhr Kaffeejause,
anschließend 16.15 Uhr Vortrag

Ort: Fakultät für Mathematik,
Oskar-Morgenstern-Platz 1,
Sky Lounge, 12. OG

Martin Bauer
Harald Rindler