GEBZE TECHNICAL UNIVERSITY

General Seminars in Mathematics

From classical mechanics to symplectic rigidity

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Abstract

Consider a particle moving in Euclidean space under the influence of a Hamiltonian energy function. All possible trajectories of this particle define a flow on the phase space $R^2 \times \ldots \times R^2$, where we paired each position coordinate with its corresponding momentum coordinate. One can assign to each (oriented) patch of surface in the phase space its symplectic area: add up the signed areas of the projections to each R^2 factor. The birth of symplectic geometry is the observation that any Hamiltonian flow preserves these symplectic areas. A symplectic manifold is a generalization of this phase space structure to spaces with more interesting topology, e.g. on a three holed torus a symplectic structure is equivalent to an area form. I will outline some recent results (including some of mine) in symplectic geometry, restricting myself to phase spaces and surfaces.

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Classroom 5
Department of Mathematics