

General Mathematics Seminar
of the
University of Luxembourg
in cooperation with the
Luxembourg Mathematical Society

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Campus Kirchberg, Room A02

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Geodesics on sub-Riemannian infinite-dimensional manifolds

Abstract:

The concept of sub-Riemannian geometry will be introduced and a possible way to generalize it to infinite-dimensional manifolds will be explained. Shortly, a sub-Riemannian manifold is a smooth manifold M with a given sub-bundle D of the tangent bundle, and with a metric defined on the sub-bundle D . We present the structure of geodesics, tangent to D , and compare them in the infinite- and the finite-dimensional cases. Infinite-dimensional Lie groups are of special interest. As examples, we consider the group of sense-preserving diffeomorphisms of the unit circle and the Virasoro-Bott group with their respective special sub-bundles, which are related to the space of normalized univalent functions. We show that any two points in these groups can be connected by a curve tangent to the chosen sub-bundle. We present formulas for geodesics for different choices of metrics. The geodesic equations are analogues to Camassa-Holm, Huter-Saxton, KdV, and other known non-linear PDE.