LEFT-INVARIANT SUB-RIEMANNIAN PROBLEMS ON LOW-DIMENSIONAL LIE GROUPS

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We consider two related sub-Riemannian problems: the sub-Riemannian problem on the group of rototranslations of a plane and the nilpotent sub-Riemannian problem on Engel group. The both problems are of important interest for sub-Riemannian geometry and optimal control, and have non-trivial applications in robotics and image inpainting.

In the talk we present the following results on these problems: parameterisation of extremal trajectories by Jacobi's functions, discrete and continuous symmetries and their fixed points, Maxwell points and cut points, conjugate points and caustic, diffeomorphic domains in preimage and image of the exponential mapping, global structure of the exponential mapping, explicit solutions for certain boundary conditions, applications.

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