Gauthier, J. P.; **Zakalyukin, V. M.**

Robot motion planning: a wild case. (English. Russian original) Zbl 1138.70316

Proc. Steklov Inst. Math. 250, 56-69 (2005); translation from Tr. Mat. Inst. Steklova 250, 64-78 (2005).

Summary: A basic problem in robotics is a constructive motion planning problem: given an arbitrary (nonadmissible) trajectory Γ of a robot, find an admissible ε-approximation (in the sub-Riemannian (SR) sense) $\gamma(\varepsilon)$ of Γ that has the minimal sub-Riemannian length. Then, the (asymptotic behavior of the) sub-Riemannian length $L(\gamma(\varepsilon))$ is called the metric complexity of Γ (in the sense of Jean). We have solved this problem in the case of an SR metric of corank 3 at most. For coranks greater than 3, the problem becomes much more complicated. The first really critical case is the 4-10 case (a four-dimensional distribution in $\mathbb{R}^{10}$. Here, we address this critical case. We give partial but constructive results that generalize, in a sense, the results of our previous papers.

For the entire collection see [Zbl 1116.37001].

MSC:

70E60	Robot dynamics and control of rigid bodies
53C17	Sub-Riemannian geometry
70G45	Differential geometric methods (tensors, connections, symplectic, Poisson, contact, Riemannian, nonholonomic, etc.) for problems in mechanics
93C10	Nonlinear systems in control theory

Full Text: MNR