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The General Solution for Affine Control Systems on Lie Groups

It is well known that for linear systems defined on \mathbb{R}^n , which has the form

$$\frac{dx}{dt} = Ax + \sum_{j=1}^m u_j b_j$$

where $A \in M(n; \mathbb{R})$ and $b_j = (b_{1j}, \dots, b_{mj}) \in \mathbb{R}^m$,

the solution curve at a point $x_0 \in \mathbb{R}^n$ is given by the formula

$$g(t, u) = e^{tA}x_0 + \int_0^t e^{(t-s)A}Bu(s)ds$$

where $B = [b_{ij}]$.

In this presentation we extend this result introducing explicitly the solution curve for affine control systems on Lie groups in the case where the automorphisms associated to the linear vector fields commute. As particular cases, we obtain the solution curves for linear and bilinear control systems.

Referências

- [1] Cardetti, F; Mittenhuber, D; *Local Controllability for Linear Control Systems on Lie Groups*. Journal of Dynamical and Control Systems, vol. 11, no. 3. Julho de 2005, 353-373 DOI:10.1007/s10883-005-6584-1.
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- [3] San Martin, L. A. B. *Grupos de Lie*. Editora UNICAMP, ed. 1, 2017.