Feedback Linearizable Discretizations of Mechanical Systems using Retraction Maps

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Outline

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Definitions

Let M and N be two n-dimensional manifolds and $\phi : M \to N$ be a diffeomorphism. Let $X \in \mathfrak{X}(M)$ be a vector field on M. Then, $X_\phi := T\phi \circ X \circ \phi^{-1}$ is a vector field on N.

Feedback Linearization

Let $x_0 \in \mathcal{O}(x_0)$ and $u_0 \in \mathcal{O}(u_0)$ be such that $f(x_0, u_0) = 0$. Then, the system is locally feedback linearizable if there exists a diffeomorphism $\phi : M \to N$ such that $X_\phi = \frac{\partial}{\partial x_n}$.

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- Cart-Pole System

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- Smoot Salute! `http://web.mit.edu/spotlight/smoot-salute`.