On the stability of smooth dynamical systems and diffeomorphisms

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Abstract

General methods of studying global stability problems of smooth dynamical systems and diffeomorphisms are presented.

In particular, one proves that any complete C^∞ vector field X in a Hilbert space E satisfying $\langle X(x), v\rangle \geq \delta > 0$ for some constant field v and all $x \in E$ (for instance, if $\|X - v\| \leq \frac{\|v\|}{2}$) is globally rectifiable to v by a C^∞ diffeomorphism of E. Thus any nonzero constant vector field in E is smoothly stable in a 0-order neighborhood.

Similarly one obtains the global stability (in a 1st-order neighborhood) of expansive non-resonant linear systems.

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