Nikitin, S.

Decoupling normalizing transformations and local stabilization of nonlinear systems. (English) Zbl 0863.34013

Math. Bohem. 121, No. 2, 225-248 (1996).

Systems of the form

$$\frac{\mathrm{d}}{\mathrm{d}t}x = Ax + \Phi(x,y),$$

$$\frac{\mathrm{d}}{\mathrm{d}t}y = By + \Psi(x,y)$$

are investigated where $x \in \mathbb{R}^m, y \in \mathbb{R}^n$, $A \in L(\mathbb{R}^m, \mathbb{R}^m)$ is a linear operator on $\mathbb{R}^n$ with $A = -A^T$, the eigenvalues of $B \in L(\mathbb{R}^n, \mathbb{R}^n)$ have negative parts, Φ, Ψ are at least C^3 vanishing together with their derivatives at the origin. It is shown that there is a normalizing transform completely decoupling the stable and center manifold dynamics of the system into two independent systems of the form

$$\frac{\mathrm{d}}{\mathrm{d}t}\widetilde{x} = A\widetilde{x} + \widetilde{\Phi}(\widetilde{x}, h(\widetilde{x})),$$

$$\frac{\mathrm{d}}{\mathrm{d}t}\widetilde{y} = B\widetilde{y} + \widetilde{\Psi}(\widetilde{x}, \widetilde{y}).$$

Some conditions for the local stabilization of the system are presented.

Reviewer: Š.Schwabik (Praha)

MSC:

34A34	Nonlinear ordinary differential equations and systems, general theory
34D05	Asymptotic properties of solutions to ordinary differential equations
34D35	Stability of manifolds of solutions to ordinary differential equations
93C10	Nonlinear systems in control theory

Keywords:
nonlinear system; stabilization; center manifold; normalizing transformation; smooth feedback

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