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Stabilization of a certain class of nonlinear systems via an observer

In this paper we study a class of nonlinear systems of the form

$$\dot{x} = Ax + Bu + f(x, u), \quad y = Cx \tag{1}$$

where $x \in \mathbb{R}^n, u \in \mathbb{R}^q$, A and B are respectively $(n \times n), (n \times q)$ constant matrices and $f = (f_1, \ldots, f_n)^T : \mathbb{R}^n \times \mathbb{R}^q \to \mathbb{R}^n$ is Lipschitz continuous such that $f(0, 0) = 0$. We give a sufficient condition for which it is possible to construct an observer for such systems. Furthermore we show that the system (1) can be globally asymptotically stabilizable at the origin using an estimateed state feedback.

Ref. : M. A. Hammami, Stabilization of a class of nonlinear systems using an observer design. 32nd IEEE Conf. Dec. Cont, San Antonio Texas (1993) 1954–1959.