Lichardová, Hana

Saddle connections in planar systems. (English) Zbl 1090.34558

Arch. Math., Brno 36, Suppl., 507-512 (2000).

Consider a system of the form

$$\dot{x} = f(x) + \varepsilon g(x, \alpha), \quad x \in \mathbb{R}^2, \quad \varepsilon, \alpha \in \mathbb{R},$$

where f, g are C^r, $r \geq 2$ and bounded on bounded sets, ε being a small parameter. Supposing that the unperturbed system with $\varepsilon = 0$ possesses a saddle connection (i.e. a trajectory connecting two saddles), the author studies a question whether there are values of a parameter α for which the perturbed system possesses a saddle connection. It is shown that under a convenient assumption on the existence of a suitable α_0 there exists $\alpha(\varepsilon) = \alpha_0 + O(\varepsilon)$ for each ε sufficiently small such that the perturbed system

$$\dot{x} = f(x) + \varepsilon g(x, \alpha(\varepsilon))$$

possesses a saddle connection, which is C^r-close to the saddle connection of the unperturbed system. The result is illustrated by an example of a planar Hamiltonian system (planar pendulum equation).

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MSC:

34C37 Homoclinic and heteroclinic solutions to ordinary differential equations

Keywords:

saddle connection; stable and unstable manifolds; small perturbation; Hamiltonian system

Full Text: EuDML EMIS

