Aubin, Jean-Pierre; Da Prato, Giuseppe

Contingent solutions to the center manifold equation. (English) Zbl 0745.34039

Ann. Inst. Henri Poincaré, Anal. Non Linéaire 9, No. 1, 13-28 (1992).

For a system of ordinary differential equations

$$x'(t) = f(x(t), y(t)), \qquad y'(t) = -\lambda y(t) + g(x(t), y(t)),$$

where X, Y are finite dimensional vector spaces, $f : X \times Y \to X$ and $g : X \times Y \to Y$ are Lipschitzian maps and $\lambda > 0$, the authors characterize a center manifold $r : X \to Y$ as a solution of the quasi- linear first order system of "contingent" partial differential inclusions (1) $\lambda r(x) \in g(x, r(x)) - Dr(x)(f(x, r(x)))$ (where D denotes the contingent derivative). They show that there exists a global bounded and Lipschitzian contingent solution to (1) if $\|g(x, y)\| \leq c(1 + \|y\|)$ is satisfied and λ is large enough. Furthermore they prove that this solution can be approximated in the spirit of the "viscosity method" by a solution r_ε to the second-order system $\lambda r(x) = \varepsilon \Delta r(x) - r'(x) f(x, r(x)) + g(x, r(x))$ when $\varepsilon \to 0$.

Reviewer: W.Müller (Berlin)

MSC:

34C30	Manifolds of solutions of ODE (MSC2000)
35R70	PDEs with multivalued right-hand sides
35A35	Theoretical approximation in context of PDEs

Keywords:

ordinary differential equations; center manifold; partial differential inclusions; contingent derivative; global bounded and Lipschitzian contingent solution; viscosity method

Full Text: DOI Numdam EuDML

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