数学

条件非线性最优扰动的最大值原理

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摘要　　在非线性系统(发展方程及常微分方程)中初始数据的扰动对系统以后某固定时刻, T的状态的影响是一个重要的研究课题. 本文研究非线性系统在初始数据在一定的范围(称为初始扰动域)内作有限幅度的扰动时, 在时刻, T对状态扰动的幅度达到最大的问题. 通过考虑反向时间的问题及假设解对初始数据的连续依赖性, 证明了若在时刻, T状态扰动的幅度达到最大, 则初始数据位于初始扰动域的边界上, 这个结果的重要意义在于可以减少数值求解扰动幅度最大问题的计算量.

关键词　　变分法　条件非线性最优扰动　最大值原理

分类号　0224　　0175.14　　0175.29

Maximum principle of conditional optimal nonlinear perturbation(Chinese)

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Abstract

The effect of initial data on the state of nonlinear systems (evolution equation and ordinary differential equations) at a fixed later time T is an important subject to study. The maximum norm of disturbances at time T when the finite amplitude of initial data disturbances restricted in a region (called the initial disturbance region) is studied. By considering the solutions to the problems of backwards in time and the hypothesizing the continuously dependence of solutions to the initial dada, it is proved that if the maximum norm of disturbances at time T is attained, then the initial data are at the boundary of the initial disturbance region. The importance of the results is on reducing the computation labor of the maximum norm of the disturbances.

Key words　calculus of variation　conditional optimal nonlinear perturbation　maximum principle

DOI:

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