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非线性动态控制系统的全局调节

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摘 要：考虑非线性动态控制系统的全局调节问题,提出了一种状态反馈调节方法,使非线性系统是全局稳定的.当稳定状态误差为0时,系统的解有界,这反映了实际系统要求在完成跟踪任务的同时,系统的内部能正常运行.此外,在给定的假设下利用不变流形理论,得到了非线性控制系统的全局调节问题使状态反馈可解的充分必要条件.对于非线性系统的局部调节问题,使非线性系统满足:系统稳态误差为0时,系统的解是渐近稳定的,它意味着在解决调节问题的同时,系统内部也趋于稳定.应用结果表明,该反馈调节方法适用于控制具有参数及结构不确定的非线性控制系统.

关键字：非线性动态控制系统;全局调节;状态反馈;不变流形

The global regulation of nonlinear dynamical control systems

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Abstract: The global regulation problem of nonlinear dynamical control systems is studied, and the state feedback regulation method is presented. With the method, the nonlinear systems is globally stable. When the steady-state error is zero,the solution of the systems is bounded. And when the practical system tracks aim without error, the systemruns well. For solving the global regulation problem of nonlinear dynamical control systems, the sufficient and necessary conditions of state feedback are obtained by using the invariant manifold theory with the given assumption. When the steady-state error of the local regulation problem of nonlinear control systems is zero, the solution of the system is asymptotically stable. It means that the regulation problem is solved, and the interior of systems is stable. The sufficient and necessary conditions are obtained for the local regulation problem. Finally, an example is given to demonstrate the application of the results.

Key words:nonlinear dynamical control systems; global regulation; state feedback; invariant manifold

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