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PARTIAL STABILITY ANALYSIS OF SOME CLASSES OF TIME–VARYING SYSTEMS

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Abstract. In this work, we characterize the partial stability of nonlinear systems via comparison functions. Further, we develop the partial stability of linear time–varying systems within Lyapunov techniques. Moreover, the indirect method of Lyapunov is also investigated to derive the local partial exponential stability. We state sufficient conditions on partial uniform exponential stability and partial practical uniform exponential stability of solutions of linear time–varying perturbed systems. Finally, an illustrative numerical example is provided.

1. Introduction

Differential equations are a fundamental means for describing the time-varying process. The study of differential equations in dynamical systems and control is of the greatest significance, since differential equations arise in all disciplines of science, medicine, biology, engineering, and economics. The theory of stability of nonlinear differential equations has become a highly prevalent topic in a lot of areas of physics and engineering. Different authors tackle the problem of stability of differential equations, see [23, 24, 25].

Recently, special attention was given to the study of the stability properties of the solution of linear systems. Determine the quality characteristics of the solution of linear time–invariant systems is more easy than the perception of similar characteristics of linear time–varying systems. This is very tough and complicated, since it demands the evolution of the transition system matrix. The study of stability analysis of linear time–varying systems is of increasing interest ([2], [10], [12]-[15]). One reason is the

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