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Global Stability Given Local Stability Via Curvature of Some Nonautonomous Differential Equations

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Abstract: In this article, the global stability, (given local stability) of a class of nonautonomous differential equations is obtained. The boundedness of the curvature of the trajectories on sets with certain properties is used to determine the stability.

Keywords: *stability; nonautonomous differential equation.*

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1 Introduction

In this study, we revisit the asymptotic stability of ordinary differential equations via the curvature properties of the trajectories. We have studied the global stability (given the local stability) of the zero solution of a class of non-autonomous linear differential equations of the type

$$x^{'}(t) = A(t)x$$

under certain conditions on the matrix A. The usual conditions on $A + A^T$ appear to be restrictive, whereas the arguments via the curvature yield the global stability given the local stability. Apparently, the theory depends on the boundedness of the curvature and a property of the trajectory called *the negative property on compact sets*. The idea of the proof is borrowed from [1], although it deals with only the autonomous systems. In this paper, the stress is on the nonautonomous differential equations.

Section 2 deals with the necessary preliminaries. The main result is stated in Section 3. Examples have been given here for illustration.

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