Integral Estimates of Solutions to Nonlinear Systems and Their Applications

On the occasion of centenary of the birth of Professor A.N.Golubentsev

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March 29, 2016 marks the 100th birthday of Professor A.N. Golubentsev, the famous scientist in the field of machine mechanics and applied mathematics. For the detailed analysis of his scientific investigations and his contribution to the development of the Institute of Mechanics of NAS of Ukraine see the paper [13] and the book [14].

Abstract: The paper deals with the nonlinear systems of ordinary differential equations. New estimates of the norms of solutions for systems under consideration are established via nonlinear integral inequalities. The results are illustrated by the problems on boundedness of solutions, finite-time stability and exponential approximation of solution to a class of nonlinear systems.

Keywords: *nonlinear system; bounded solutions; finite-time stability.*

Mathematics Subject Classification (2010): 34A34, 34C11, 34C60, 93D05.

1 Introduction

For solution of problems of nonlinear dynamics different analytical and qualitative methods of general theory of equations are applied being adapted to a particular problem or a class of similar problems. For instance, in monograph [1] a method of dynamics analysis is considered for the systems described by the equations containing integrals with variable upper limit. The authors discuss physical meaning of the resolvent of integral equation and present basic analytical correlations relating the character of transient process in the system with its parameters. As to the dynamics of machines, a resolvent

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