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Some Generalized Nonlinear Volterra-Fredholm Type Integral Inequalities with Delay of Several Variables and Applications

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Abstract: In the present paper, some new explicit bounds on solutions to a class of new nonlinear retarded integral inequalities of Volterra-Fredholm type for the functions of n-independent variables are established, which generalize some known integral inequalities. The derived results can be used as useful tools in the study of certain integral and differential equations of Volterra-Fredholm type. An application is given to illustrate the usefulness of our results.

Keywords: *delay integral inequality; Volterra-Fredholm type integral inequalities; explicit bounds; n-independent variables.*

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1 Introduction

It is well known that the Gronwall-Bellman integral inequality [3,8] and its various generalizations which provide explicit bounds on unknown functions have played an important role in the study of existence, uniqueness, boundedness, and other qualitative properties of solutions of differential equations, integral equations and have been applied in the stability analysis of solutions to dynamic equations on time scale [1, 12]. Recently, many authors have further improved more general forms of this inequality [2, 4, 6]. In the past few decades, many such new interesting retarded integral inequalities of Volterra-Fredholm type were established [10, 15].

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