GENERALIZED MONOTONE METHOD FOR NONLINEAR BOUNDARY VALUE PROBLEM OF MATRIX DIFFERENTIAL EQUATIONS

S.N.R.G. Bharat Iragavarapu,[1*] D.B. Dhaigude[2] and J.Vasundhara Devi[3]

[1,3] Department of Mathematics,
and Gayatri Vidya Paridhad -Prof. V. Lakshmikantham Institute for Advanced Studies
Gayatri Vidya Paridhad College of Engineering(Autonomous)
Visakhapatnam - 530048, AP, India
[2]Visiting Emeritous professor
Gayatri Vidya Paridhad -Prof. V.Lakshmikantham Institute for Advanced Studies
Visakhapatnam - 530048, AP, India
*Corresponding Author: bharat@gvpce.ac.in

Abstract: By introducing the notion of quasisolutions and using the lower and upper solutions we develop the generalized monotone method to study IVP of matrix-differential equations. We construct monotone iterates which are solutions of IVP associated with MDE, that are easy to obtain. In this paper we show that these iterates converge uniformly and monotonically to minimal and maximal solutions and are really quasisolutions of nonlinear BVP of matrix differential equations.

Keywords: Matrix differential equations, lower and upper solutions, existence of a solution, uniqueness, monotone iterative technique, maximal and minimal solutions, quasi solutions.

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1   Introduction

The concept of the derivative of a matrix was considered and matrix differential equations(MDEs) were introduced and a solution of the matrix differential equations was obtained in [1]. Monotone iterative technique [2,3,4] combined with method of upper and lower solutions is an effective tool and a flexible technique that provides existence and uniqueness of solutions for IVPs. It is quite obvious that the study of boundary value problems(BVPs) for the considered equations is much more complicated than those of the corresponding IVPs.

Pandit et.al [5] successfully used the MIT for the IVP to obtain the existence and uniqueness of solutions of the corresponding BVP. MIT has been developed for nonlinear boundary value problems in [6,7]. In this paper, using the ideas in Pandit's paper first we introduce the notion of quasisolutions