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QUASILINEARIZATION TECHNIQUE FOR PERIODIC BOUNDARY VALUE PROBLEM OF GRAPH DIFFERENTIAL EQUATIONS AND ITS ASSOCIATED MATRIX DIFFERENTIAL EQUATIONS

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Abstract. A network can be represented by graph which is isomorphic to its adjacency matrix. Thus the analysis of networks involving rate of change with respect to time reduce to the study of graph differential equations and its associated matrix differential equations. In this paper we develop Quasilinearization technique for a graph differential equations and its associated matrix differential equations using quasilinearization for IVPs.

Keywords. Pseudo Graph, Graph differential equation, Matrix differential equation, coupled lower and upper solutions, Quasilinearization.

AMS (MOS) subject classification: 34G20.

1 Introduction

While modeling physical phenomena it can be observed that inter connections in a physical and biological or a social system can be well represented by a graph. If the physical phenomena is time dependent then a graph that varies with time appropriately describes the physical phenomena. Keeping this in mind the derivative of a graph and a graph differential equation were introduced in [1]. The existence of a solution of an IVP of the GDE was studied by developing the monotone iterative technique (MIT) in [4]. The concept of a pseudo graph was introduced in [5] and the famous prey predator problem was modeled through a graph differential equation.

In all the fore mentioned papers initial value problems for graph differential equations have been studied. Generalized quasi linearization has been developed for IVPs for GDEs in [3]. In all the fore mentioned papers, the GDEs were studied using the MDEs, which is possible because of the isomorphism that exists between graphs and matrices.