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ITERATIVE METHODS FOR A FOURTH-ORDER DIFFERENTIAL EQUATIONS WITH RETARDATION AND ANTICIPATION

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Abstract. In this paper, the boundary value problem of a fourth-order differential equation with retardation and anticipation was investigated, and the estimates of errors are established for the approximate solutions obtained by using the Picard's iterative and approximate Picard's iterative methods.

Keywords. Picard's iterative methods; differential-difference equation; boundary value problem; approximate solution.

AMS (MOS) subject classification: 34K28, 65L70.

1 Introduction

The Differential-difference equations have received a lot of attention during the past decades. We can refer to the monographs of Bellman and Cooke [1], Agarwal [2], Fridman [3], Lin and Chen [4] and the references cited therein. Some interesting results have been obtained concerning the existence of solutions and the approximation of solutions for the boundary value problem of differential-difference equations. For example, Wang and Li [5], Wang [6,7] discussed the existence and uniqueness of solution for a second-order, third-order and fourth-order differential equation with retardation and anticipation, respectively. However, to the best of our knowledge, there are few results on the iterative and approximate iterative solution, especially the estimation of error between the approximate solution and the solution. Agarwal and Chow [8], Agarwal and Loi [9] gave Picard's iterative results and the approximate Picard's iterative results for the high order ordinary differential equations. The purpose of this paper is consider an approximate solution and the estimation of error between the approximate solution and the solution for the boundary value problem of a fourth-order differential equation with