

## GENERALIZED QUASILINEARIZATION FOR PBVP THROUGH COUPLED LOWER AND UPPER SOLUTIONS OF THE IVP

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**Abstract.** In this paper, we first develop the generalized quasilinearization technique for an initial value problem by using coupled lower and upper solution of type I and use it to obtain the unique solution of a periodic boundary value problem. In order to develop the method of quasilinearization in this set up, we fix either the lower solution or the upper solution. Further, using the method developed for IVP for ordinary differential equations, we obtain the generalized quasilinearization technique for PBVP and prove the existence of a unique solution under certain criteria.

**Keywords:** Coupled lower and upper solutions, Quasilinearization technique.

**AMS (MOS) subject classification:** 34A12, 34A34 .

## 1 Introduction

Quasilinearization is a very important and an interesting iterative technique as it generates a sequence of functions, which are solutions of linear equations corresponding to the given problem, that converge quadratically to the considered problem. Both quasilinearization and monotone iterative techniques [1,2,3,4] combined with method of upper and lower solutions are effective tools and flexible techniques that provide existence result in a closed sector generated by the lower and the upper solutions in this problem. In [5,6] monotone iterative technique for PBVP was developed by constructing monotone sequences, which are solutions of IVPs of linear differential equations. These solutions are unique and hence the monotone sequences so obtained are unique. These sequences converge to a unique function and it is proved to be a solution of considered PBVP. The special advantage of this approach is that working with IVPs of linear differential equations is easy and the existence of the solutions of the PBVP is guaranteed with no extra assumptions.