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A Parallel Numerical Method for Solving Optimal Control Problems based on Whale Optimization Algorithm

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Abstract

Development of a numerical algorithm for solving optimal control problems is reported in this article. The method is a combination of multi-staging of the original problem to a finite dimensional optimization problem and the recently proposed Whale Optimization Algorithm (WOA). The method is proposed to reduce the required number of iterations. The parallel implementation is also proposed and discussed. Numerical examples are given to check the validity and accuracy of the proposed method. Results show that method converges to the exact solution with accuracy comparable to other numerical methods.

Keywords: Optimal control, Whale optimization algorithm, Numerical solution, Parallel computing

1. Introduction

Optimal control problems have a wide range of real world application and are usually challenging due to their large scale and complexity of relations. Therefore, finding the analytical solutions by traditional method for such problems have a little chance of success. Naturally, with the development of computers, many researches have focused on numerical methods for solving optimal control problem. These algorithms have been pre-

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