Applicaion of a Python-based Distributed Computing for Numerical Solutions of a Block Predictor-Corrector Scheme in ODEs

李明恭, 游坤明, 鄭至傑

Leisure and Recreation Management

Tourism

mglee@chu.edu.tw

Abstract

This paper is to discuss how Python can be used in designing a cluster parallel computational environment in numerical solution of a block predictor-corrector scheme for ordinary differential equations. In the parallel process, MPI-2 (message passing interface) is used as a standard of MPICH2 to communicate between CPUs. The operation of data receiving and sending are operated and controlled by mpi4py which is based on Python. Functions such as "send", "recv", "get_size", and "get_rank" are used in the parallel scheme. Implementation of a block predictor-corrector scheme of ordinary differential equations with one and two CPUs is experimented to test the performance of the proposed environment. Minor speed up is obtained due to the small size problems and very few CPUs are used in the environment, nevertheless, the establishment of this environment by Python is valuable due to very few research have been carried out in this kind of parallel structure under Python.

Keyword：Ordinary differential equations (ODEs), Parallel computing, Block Predictor-Corrector formulas (block method), PC Cluster, MPI, Python