

A Parallel Block Predictor-Corrector Method by Python-Based Distributed Computing

游坤明, 李明恭

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 computation environment in numerical solution of some block predictor-corrector method 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 numerical method with one and two CPUs respectively is used to test the performance of some initial value problem of ordinary differential equations. Minor speed up is obtained due to small size problems and few CPUs used in the scheme, though the establishment of this scheme by Python is valuable due to very few research has been carried 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