A Parallel Implementation of an Implicit Discontinuous Galerkin Finite Element Scheme for the Steady and Unsteady Flow Problems

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Abstract

The discontinuous Galerkin (DG) finite element method [2, 3] has become very popular in recent years. Many papers have shown advantages of the DG method, for example its stability and high order of spatial accuracy. The main disadvantage of the DG method is its high computational demands. The previous work [1] was focused on the weakening of this drawback and on the comparison of the numerical efficiency of explicit local time-stepping and implicit time-integration schemes. This work tries to overcome high computational demands of the DG method by employing parallelization on the developed algorithm. The parallelization is based on the original Schwartz method [4]. The computation is performed on a network of computers with distributed memory using the remote invocation method technology included in the JAVA programming language. The efficiency of the parallelization is demonstrated on a several test problems.

References

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