Parallel Multi-grid Algorithm Based on Cluster Computing with Application to Transient Heat Transfer

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ABSTRACT

The partial differential equations are often used in science and engineering applications. The solutions cannot be got analytical, so the numerical methods are often used to get approximate results. To achieve high precision, more computing time is needed. But the long time in practical applications is not often allowed, so the precision of final results has to be reduced. Based on cluster system, this paper studies the parallel multi-grid method and its application in the numerical analysis of heat transfer. The results from the sample show that the method not only can expand the size of solved problems efficiently, but also can gain excellent parallel efficiency; therefore it is a method suitable for network parallel environment based on cluster system.

Keywords: parallel algorithm; multi-grid algorithm; heat transfer; heat conduction; domain decomposition methods; cluster computing