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The Effectiveness Analysis of Several Parallel Algorithms Based on Simulated Annealing Method of Global Optimization Problem Solving

A. V. Vysotsky, A. S. Tarakanov, K. I. Sholomov, N. E. Timofeeva, A. A. Eroftiev

Saratov State University, Russia, 410012, Saratov, Astrahanskaya st., 83, alex_v2008@mail.ru, tarakanov.alexey@gmail.com, sholomov@mail.ru, timofeevane@info.sgu.ru, eroftiev.andrey@gmail.com

This article presents the results of the development of a parallel computing system and testing its capabilities applied to solving scientific and educational problems. Three parallel variants of the simulated annealing algorithm are proposed and implemented for multiextreme criterion function of two variables with explicit constraints. The reliability and performance of parallel versions of the algorithm, depending on their parameters and the number of working nodes in parallel computing system, is investigated. It is shown that proposed parallel variants of simulating annealing algorithm allow successful finding the global minimum of multiextreme criterion function.

Key words: global optimization, simulated annealing, multiextreme criterion function, explicit constraints, parallel computing.

References

1. Lopatin A. S. Simulated Annealing. *Stokhasticheskaia optimizatsiia v informatike : mezhvuz. sb.* [Stochastic Optimization in Informatics]. St. Petersburg, 2005, iss. 1, pp. 133–149 (in Russian).
2. Savin A. N, Timofeeva N. E. Using Optimization Algorithm Based on Simulated Annealing on Parallel and Distributed Computing Systems. *Izv. Sarat. Univ., N.S., Ser. Math. Mech. Inform.*, 2012, vol. 12, iss. 1, pp. 110–116 (in Russian).
3. Kirkpatrick S. A., Gelatt C. D., Vecchi M. P. Optimization by simulated annealing. *Science, N.S.*, 1983, vol. 220, no. 4598, pp. 671–680.