

Comparative analysis of parallel computational schemes for solving the time-consuming decision making problems

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Abstract. In the present paper, an efficient approach to the parallel solving of the complex multicriterial optimization problems using the heterogeneous computing systems is considered. The complexity of these problems can be very high as the optimized criteria can be multiextremal and the computing of the criteria values can be time-consuming. In the framework of the proposed approach the multicriterial optimization problem is reduced to solving a series of global optimization problems by means of the convolution of the partial criteria with different sets of parameters. To solve the series of the global optimization problems, the efficient information-statistical global search method is applied. The parallel computations are implemented by solving several global optimization problems simultaneously. This approach provides parallel computing the criteria values with the several optimized parameters. The maximum use of the search information obtained in the course of the computations is an important distinctive feature of the developed parallel computational schemes. The comparative analysis of various methods for parallel computations and numerous numerical experiments are presented in the paper.

Keywords: Decision making, multicriterial optimization, parallel computing, dimensionality reduction, criteria convolution, global optimization algorithm.