Parallel Computations for Various Scalarization Schemes in Multicriteria Optimization Problems

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In the present paper, a novel approach to parallel computations for solving the time-consuming multicriteria global optimization problems is presented. This approach includes various methods of the scalarization of the vector criteria, the dimensionality reduction with the use of the Peano space-filling curves, and the efficient global search algorithms. The applied criteria scalarization methods can be altered in the course of computations in order to achieve more complete matching to the stated optimality requirements. The overcoming of the computational complexity of the developed approach is provided by means of the reuse of the whole search information obtained in the course of computations and by the parallel computations for the high-performance computational systems. The numerical experiments confirmed the efficiency of the developed approach.

Keywords: Multicriteria optimization, Criteria scalarization, Global optimization, Parallel computations.