

Adaptive Scalarization Methods in Multiobjective Optimization

In many areas in engineering, economics and science new developments are only possible by the application of modern optimization methods. The optimization problems arising nowadays in applications are mostly multiobjective, i.e. many competing objectives are aspired all at once. These optimization problems with a vector-valued objective function have in opposition to scalar-valued problems generally not only one minimal solution but the solution set is very large. Thus the development of efficient numerical methods for special classes of multiobjective optimization problems is, due to the complexity of the solution set, of special interest. This relevance is pointed out in many recent publications in application areas such as medicine ([63, 118, 100, 143]), engineering ([112, 126, 133, 211, 224], references in [81]), environmental decision making ([137, 227]) or economics ([57, 65, 217, 234]).

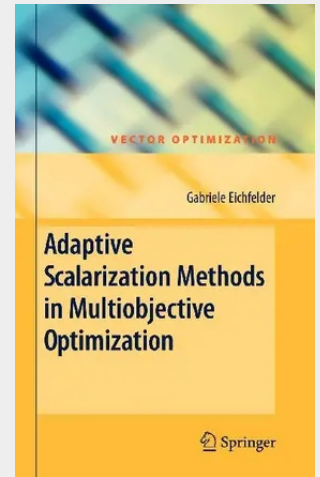
Considering multiobjective optimization problems demands the definition of minimality for such problems. A first minimality notion traces back to Edgeworth [59], 1881, and Pareto [180], 1896, using the natural ordering in the image space. A first mathematical consideration of this topic was done by Kuhn and Tucker [144] in 1951. Since that time multiobjective optimization became an active research field. Several books and survey papers have been published giving introductions to this topic, for instance [28, 60, 66, 76, 112, 124, 165, 188, 189, 190, 215].

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