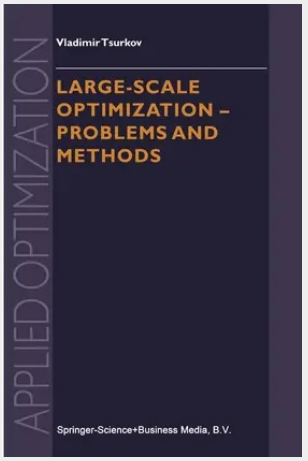
Tsurkov

Large-scale Optimization

Problems and Methods



Decomposition methods aim to reduce large-scale problems to simpler problems. This monograph presents selected aspects of the dimension-reduction problem. Exact and approximate aggregations of multidimensional systems are developed and from a known model of input-output balance, aggregation methods are categorized. The issues of loss of accuracy, recovery of original variables (disaggregation), and compatibility conditions are analyzed in detail. The method of iterative aggregation in large-scale problems is studied. For fixed weights, successively simpler aggregated problems are solved and the convergence of their solution to that of the original problem is analyzed. An introduction to block integer programming is considered. Duality theory, which is widely used in continuous block programming, does not work for the integer problem. A survey of alternative methods is presented and special attention is given to combined methods of decomposition. Block problems in which the coupling variables do not enter the binding constraints are studied. These models are worthwhile because they permit a decomposition with respect to primal and dual variables by two-level algorithms instead of three-level algorithms.
This book is addressed to specialists in operations research, optimization, and optimal control.

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