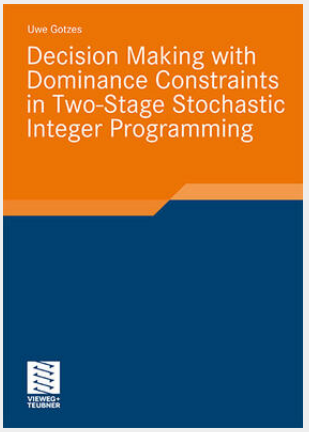
Gotzes

Decision Making with Dominance Constraints in Two-Stage Stochastic Integer Programming



Uwe Gotzes analyzes an approach to account for risk aversion in two-stage models based upon partial orders on the set of real random variables. He illustrates the superiority of the proposed decomposition method over standard solvers for example with numerical experiments with instances from energy investment.

Stochastic dominance, an established concept in decision theory, has gained att- tion in stochastic programming only recently. The present monograph contributes to this line of research. It deals with stochastic programming models incorporating risk aversion via stochastic dominance constraints. The latter arise by comparing decision dependent random variables and pre-speci?ed benchmarks. This induces some notion of acceptance: Only those decisions are feasible that lead to random entities, e.g., costs, returns, orrevenues, whichcomparefavorablytosomerandom benchmark pro?le re?ecting the user's desire. This monograph addresses decision making with stochastic dominance c- straints in the framework of two-stage mixed-integer linear stochastic progr- ming. Its main results concern basic structural ?ndings, novel decomposition - gorithms for the numerical solution of the large-scale stochastic programs arising, and case studies on two exemplary industrial optimization problems under unc- tainty, namely competitive selling price determination for electricity retailers and planning of a local network for heat supply. Thus, both readers interested in ma- ematical foundation or practical application of optimization under uncertainty may ?nd this text interesting. The monograph grew out of a doctoral dissertation prepared during 2005–2008 at the Chair of Discrete Mathematics and Optimization in the Department of Ma- ematics of the University of Duisburg-Essen. This research has been supported by the German Federal Ministry of Education and Research (BMBF) within the program "Netzwerke Grundlagenforschung erneuerbare Energien und rationelle Energieanwendung".

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