Decision rules for multi-stage adjustable robust optimization

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Abstract Multi-stage adjustable robust optimization, as a subclass of multi-stage optimization under uncertainty problems, constitutes a class of problems that are very difficult to solve in practice. Although, the exact solution of these problems under certain special cases may be possible, for the general case, there are no known exact solution algorithms. Instead, approximate solution methods have been developed, either restricting the functional form or the feasibility space of recourse actions, these are generally referred to as "decision rules". In this talk, we will present a review of existing decision rule approximations including affine and extended affine decision rules, uncertainty set partitioning schemes and finite-adaptability. We will discuss the reformulations and solution algorithms that result from these approximations. We will point out existing challenges in practical use of these decision rules, and point out current and future research directions. When possible we will point out the connections to multi-stage stochastic programming literature.