Strong Convexity in Stochastic Programs with Deviation Risk-Measures

M. Claus[1], R. Schultz[2], and K. Spürkel[3]

Abstract: In stochastic programming, deviation risk measures are a widely used tool to quantify variability of risk and arrive at risk-averse solutions to optimization problems under uncertainty. Some of those can be represented as convex integral functionals that consequently share important structural properties with the expectation. We shall derive sufficient conditions for strong convexity of the expected excess and upper semideviation, risk measures that fall into that category, in the context of two-stage stochastic programming with complete linear recourse. Strong convexity, while being a desirable property of objective functions anyway, also yields stability of the stochastic optimization problem with respect to perturbations of the underlying probability distribution. This justifies, for example, statistical methods to arrive at good approximations to solutions of the original problem.

[1,2,3] Faculty of Mathematics
University of Duisburg-Essen
Thea-Leymann-Strasse 9, 45127 Essen, Germany
{*matthias.claus, ruediger.schultz, kai.spuerkel*}*@uni-due.de*