

**CONVEX APPROXIMATIONS
OF CHANCE CONSTRAINED PROGRAMS**

Arkadi Nemirovski

nemirovs@ie.technion.ac.il

Technion — Israel Institute of Technology, Haifa, Israel

Alexander Shapiro

ashapiro@isye.gatech.edu

Georgia Institute of Technology, Atlanta, Georgia, USA

We consider a chance constrained problem, where one seeks to minimize a convex objective over solutions satisfying, with a given close to one probability, a system of randomly perturbed convex constraints. Our goal is to build a computationally tractable approximation of this (typically intractable) problem, i.e., an explicitly given deterministic convex optimization program with the feasible set contained in the one of the chance constrained problem. We present a general scheme for building approximations and focus on a specific large deviation type “Bernstein approximation” of a chance constrained problem with affinely perturbed chance constraints. Finally, we extend the Bernstein approximation to the case of ambiguously chance constrained problems, where the random perturbations are independent with the collection of distributions known to belong to a given convex compact set rather than to be known exactly, while the chance constraint should be satisfied for every distribution given by this set.