

**BETTER OPTIMIZATION OF NONLINEAR UNCERTAIN SYSTEMS (BONUS):
A NEW ALGORITHM FOR STOCHASTIC PROGRAMMING FOR LARGE SCALE SYSTEMS**

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A new nonlinear programming algorithm is proposed for stochastic programming problems. This method relies on sampling to estimate the probabilistic objective function and constraints. The computational burden of excessive model calculations for determining the search direction is bypassed through a reweighting method using Kernel Density Estimation. The improvements accomplished by this algorithm called Better Optimization of Nonlinear Uncertain Systems (BONUS) are presented through two real world case studies, namely, (1) Taguchi's quality control approach for off-line quality control of a chemical reactor, and (2) vehicle structural design for safety.