

# Optimization Problems with probabilistic/robust (proburst) constraints: Theory, Numerics and Applications

*Monday, August 12, 2024 10:30 AM (1 hour)*

Probabilistic Constraints have become one of the most popular tools to deal with uncertain inequality constraints in engineering problems. When a decision has to be taken prior to observing uncertain parameters affecting the constraint, then it is very natural to define a decision as feasible whenever the uncertain constraint is satisfied with high probability. Due to the absence of explicit formulae, such inequalities introduce a lot of challenges in their analysis and algorithmic treatment. This is the more true if the random inequality system is not finite but infinite. Then, the index of the system can be interpreted as another uncertain parameter of 'robust' (non-stochastic) nature. This gave rise to introduce the class of so-called probabilistic/robust, shortly: proburst constraints. The talk addresses analytical properties, such as semi-continuity, Lipschitz continuity, differentiability, existence of solutions and optimality conditions for proburst constraints. Moreover, numerical approaches via the so-called spherical-radial decomposition and adaptive index refinement are presented and some applications in energy management (capacity maximization in gas networks, water reservoir management) are discussed.

**Presenter:** Prof. HENRION, René (Weierstrass Institute for Applied Analysis and Stochastics)

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