

# 2011 IEEE SMC Hiroshima Chapter Special Lecture

主催: IEEE SMC Hiroshima Chapter

共催: 日本経営システム学会「イノベーション指向データ分析」研究部会

日時: 2011年3月5日(土) 16:00-17:30

場所: 広島経済大学立町キャンパス 2階 121教室

[http://www.hue.ac.jp/life/facilities/tatemachi\\_campus.html](http://www.hue.ac.jp/life/facilities/tatemachi_campus.html)

参加費: 無料

**Title:** On Fuzzy Stochastic Optimization

**Speaker:** Prof. M.K. Luhandjula,

Department of Decision Sciences, University of South Africa

**Chair:** Prof. Hideki Katagiri, Hiroshima University

**Abstract:**

In many real-life problems one has to base decision on information which is both fuzzily imprecise and probabilistically uncertain. Although consistency indexes providing a union nexus between possibilistic and probabilistic representation of uncertainty exist, there are no reliable transformations between them. This calls for new paradigms for incorporating the two kind of uncertainty into mathematical models.

Fuzzy Stochastic Optimization is an attempt to fulfill this need. Its disciplinary matrix consists of analysis of mathematical programs under fuzziness and randomness along with methods for solving them. Significant tools for taking an intellectual step towards situations where fuzziness and randomness co-occur quickly developed and provided the catalyst for a continuing surge of research in this emerging field of Mathematical programming under hybrid uncertainty.

It is worth mentioning that solving a fuzzy stochastic mathematical program is a hard issue that entails finding the joint fuzzy probability distribution of the solution. It also requires dealing with the curse of dimensionality due to the simultaneous occurrence of possibilistic and probabilistic information.

In practice one usually is satisfied with less namely, solve a suitable approximate surrogate. This surrogate is crafted by exploiting, to a great extent, the available structure while sticking, as well as possible, to uncertainty principles.

In this talk, we focus on three chosen models in the rich array of situations where fuzziness and randomness are under one roof in an optimization setting, namely, a flexible program under randomness, a mathematical program with random variables having fuzzy parameters and an optimization problem involving fuzzy random coefficients.

To handle these hybrid models, we resort respectively to Bellman-Zadeh's confluence principle, Buckley's uncertain probabilities and Luhandjula's Embedding Theorem for fuzzy random variables. Numerical examples are also provided for the sake of illustration. We shall end the talk by pointing out some challenges that currently occupy researchers in this emerging field.

**Keywords :** Optimization, fuzziness, randomness, fuzzy random variable.

**問い合わせ先:**

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