Speaker:

José Núñez Ares – Chief Scientific Officer EFFEX

Title:

OMARS designs analysis, bridging the gap between screening and optimization experimental designs

Abstract:

In 2011, Jones and Nachtsheim introduced the Definitive Screening Designs as three-level designs for factor screening and optimization. The underlying idea of their proposed experimental designs is that, in the presence of effect sparsity, a single experimental design can be used for both screening and optimization. Ockuly et al. show that effect sparsity holds in a collection of 129 experimental data sets with a total of 183 responses. In recent years, OMARS designs have been introduced. The OMARS family of designs extends the catalog of designs that allow screening and optimization in a single step substantially, and they can be used for quantitative, two-level categorical, and blocking factors. In this talk we will demonstrate a multi-criteria design selection algorithm.

Typically, one-step designs for simultaneous screening and optimization involve a large number of factors, making the analysis of experimental data difficult. The challenge is to select the most influential effects and construct a meaningful model, given the fact that there is a large number of potential effects. Recent work has proposed analysis techniques tailored to these designs. We will show how the analysis of OMARS benefits from the use of an all-subsets model selection technique based on integer programming, which can handle problems with more than a hundred potential effects.

Finally, multi-response optimization problems are the norm in the pharmaceutical industry. Defining the design space in the presence of multiple and often conflicting critical quality attributes is challenging. We will show how interactive graphical interfaces can be used to explore the probability of success of being with specifications and assess the robustness of different candidates for values of the critical process parameters.

The demonstrations will be made using a novel web-based software and an example inspired by a real case in the pharmaceutical industry.

Short bio

José Núñez Ares obtained his PhD under the supervision of prof. Peter Goos at KU Leuven (Belgium) and worked as a postdoctoral researcher at UW Madison (USA) and KU Leuven. In 2023, he co-founded the software company EFFEX, which aims to become a reference in industrial design of experiments. In addition to his research, José has carried out several consultancy projects for companies in different sectors such as energy, chemicals or pharmaceuticals. Putting research results into practice in an interactive and simple way is what motivates him and is his main concern at EFFEX.