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# Experimental designs and Kriging modelling: the use of strong orthogonal arrays

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Nowadays, physical experimentation for some complex engineering and technological processes appears too costly or, in certain circumstances, impossible to be performed. In those cases, computer experiments are conducted in which a computer code is run to depict the physical system under study. Specific surrogate models are used for the analysis of computer experiments functioning as statistical interpolators of the simulated input-output data. Despite the large class of such surrogate models, the Kriging is the most widely used one. Furthermore, a fundamental issue for computer experiments is the planning of the experimental design. In this talk, we describe a compelling approach for the design and analysis of computer experiments, also considering Nikiforova et al. (2021). More precisely, we build a suitable Latin Hypercube design for the computer experiment through a new class of orthogonal arrays, called strong orthogonal arrays (He and Tang, 2013). This design achieves very good space-filling properties with a relatively low number of experimental runs. Suitable Kriging models with anisotropic covariance functions are subsequently defined for the analysis of the computer experiment. We demonstrate the satisfactory results of the proposal by an empirical example, confirming that the suggested approach could be a valid method to be successfully applied in several application fields.
Keywords: computer experiments, Kriging modelling, strong orthogonal arrays, anisotropic covariance.

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**Primary authors:** Dr LUCIANO, Cantone (Dept of Engineering for Enterprise "Mario Lucertini", University of Rome "Tor Vergata); NIKIFOROVA, Nedka Dechkova (Department of Statistics Computer Science Applications "G. Parenti", University of Florence); BERNI, ROSSELLA (Dept. Statistics Computer Science Application G. Parenti)

**Presenter:** NIKIFOROVA, Nedka Dechkova (Department of Statistics Computer Science Applications "G. Parenti", University of Florence)

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