

Minisymposium proposal (**REVISED**) for WCCM, IACM-ECCOMAS08

## **Metamodels for High Dimensionality Response Surfaces in Multiobjective Optimization**

When performing large scale optimizations involving many simultaneous and often conflicting objectives, hundreds and even thousands of design variables, and dozens of equality and inequality constraints, and where each objective function evaluation is very costly, the only practical method of reducing the overall computing effort is to use metamodels or lower fidelity models. The most popular such method is to perform analytical fits of the available high fidelity data thus creating multidimensional response surfaces. Current methods for the creation of the response surfaces are based on algorithms such as linear regression, radial basis functions, wavelet based neural networks, self-organizing maps, graph theory, Kriging, etc. All of these methods suffer from rapidly decreasing accuracy and rapidly increasing computing time as the number of design variables increases. Furthermore, most of the currently used methods are not capable of dealing with irregularities and noise of the realistic design space topologies which are unknown *a priori*.

Since optimization is becoming widely accepted in industry when performing multidisciplinary design involving simultaneously disciplines such as fluid mechanics, elasticity, heat transfer, electromagnetism, chemistry, etc., there is a recognized and growing need for the development of more reliable, accurate and computationally efficient methods for the automatic construction of multidimensional response surfaces for hundreds and even thousands of design variables.

The proposed minisymposium should bring together international experts on this subject and serve as a perfect event for comparing the capabilities and drawbacks of conceptually different algorithms and their hybrid combinations for fitting large dimensionality response surfaces, thus advancing the fields of large scale multi-objective optimization and design.

Minisymposium Organizers:

Principal Organizer: Prof. George S. Dulikravich  
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