Inverse Problems, Design & Optimization

IN HEAT TRANSFER

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HELCIO R. B. ORLANDE\*, GEORGE S. DULIKRAVICH†, MARCELO J. COLAÇO\* AND ZBIGNIEW BULINSKI††

\*Federal University of Rio de Janeiro-UFRJ, Mechanical Engineering Department, Politecnica/COPPE

Cid. Universitaria, Cx. Postal: 68503, Rio de Janeiro, RJ, 21941-972, Brazil

helcio@mecanica.coppe.ufrj.br mc@pobox.com

† Florida International University, Mechanical & Materials Engineering Department, MAIDROC

10555 West Flagler Street, FIU Eng. Center, Miami, FL 33174, U.S.A.

dulikrav@fiu.edu http://maidroc.fiu.edu and URL

†† Silesian University of Technology, Department of Thermal Technology

Konarskiego 22, 44-100 Gliwice, Poland

zbigniew.bulinski@polsl.pl http://www.itc.polsl.pl/bulinski

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ABSTRACT

Inverse problems, design theories and multi-objective constrained optimization strategies are three areas of advanced research of great interest for practicing engineers and designers. These three major areas of research have a number of things in common. For example, many methodologies for solving inverse problems employ optimization algorithms. On the other hand, optimization techniques generally do not employ methods of inverse design, although they could potentially reduce the number of time-consuming analysis required by the typical evolutionary optimization algorithms. Similarly, design theory is commonly not used by the optimization community, where formulation of the appropriate multiple objectives and system-of-systems design formulations are often performed using intuition and personal experience.

The solution of inverse, design and optimization problems needs to cope with uncertainties in the mathematical model of the forward problem, in the numerical method of solution, metamodeling, measured data, boundary conditions, properties of the media, and others. As a result, statistical techniques play a fundamental role in practical applications.

The objective of this minisymposium is to offer a forum on inverse, design and optimization problems in heat transfer. Contributions are particularly welcome on novel applications, such as in biomedicine, small scale processes, high temperatures and high pressures, materials design, as well as on statistical solution techniques, like those within the Bayesian framework.