

**OPTIMIZATION IN STRUCTURAL AND RESERVOIR ENGINEERING  
TRACK NUMBER (1300)**

**SILVANA M B AFONSO<sup>\*</sup>, BERNARDO HOROWITZ<sup>†</sup>**

<sup>\*</sup> professor  
Federal University of Pernambuco  
Civil Engineering Department  
smb@ufpe.br

<sup>†</sup> professor  
Federal University of Pernambuco  
Civil Engineering Department  
horowitz@ufpe.br

**Key words:** Optimization, Structures, Reservoir Engineering.

**ABSTRACT**

The advances in computational and numerical capabilities allow more efficient Engineering design, through the solution of optimization problems. Thus, new realistic and challenging optimization applications in practical Engineering have been tackled. Among them we have sophisticated based structural analysis applications and reservoir engineering management applications.

This mini-symposium is dedicated to the discussion of recent developments and applications of optimization techniques, sensitivity analysis and surrogate modelling in the field of Structural and Reservoir Engineering and related areas considering both deterministic and stochastic approaches. When the later is considered the process of finding such optimum is referred to as Robust Design Optimization (RDO), in which feasibility improvement and variability reduction in the performance are the targets.

This because optimization under a deterministic approach generally leads to a final design whose performance may degrade significantly and a design that can violate constraints because of perturbations arising from uncertainties. In the real world, for structural designs uncertainty and randomness are related to the structural dimensions/and or material properties a reliability based constraint could also be included in the problem formulations or such applications. In the context of reservoir management they are prevalent due to the lack of accurate petrophysics data such as permeability and porosity fields among other uncertainty sources.

In general the practical applications of the problems addressed here are coding intensive to obtain both function evaluations and its gradient as well as to the fact that they are associated with a large number of design variable. To overcome that different strategies like surrogate models, approximated gradients computation, design variables parametrization, high performance computation and so on are recently investigated.

The goal than of this minysimposia is to bring together researchers, students and professionals in the field of structural and reservoir engineering. Papers related to practical applications of optimization methods as well as software development are encouraged to be submitted in this mini-symposium.

### REFERENCES

- [1] Motta, R. S.; Afonso, Silvana M. B. An Efficient Procedure for Structural Reliability-Based Robust Design Optimization. *Structural and Multidisciplinary Optimization* , v.54, p.511 - 530, 2016
- [2] Pinto, J. W. O., Tueros, J. A. R., Horowitz, B., Silva, S. M. B., Willmersdorf, R. B. [2018]. Gradient-free Strategies to Robust Well Control Optimization. In *EAGE/TNO Workshop on OLYMPUS Field Development Optimization*. DOI: 10.3997/2214-4609.201802299.