OPTIMIZATION, METAHEURISTICS AND EVOLUTIONARY ALGORITHMS IN CIVIL ENGINEERING

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Key words: Evolutionary Algorithms, Genetic Algorithms, Metaheuristics, Computational Methods, Civil Engineering, Construction Management, Optimum Design, Robust Design.

ABSTRACT

The main objective of this symposium is to bring together researchers and to generate interest in presenting papers on new approaches, in the field of optimization, metaheuristics and evolutionary algorithms in civil engineering.

The communications must address metaheuristics, evolutionary algorithms and other optimization techniques, applied in solving optimum design problems in civil engineering and related topics [1,2].

Evolutionary algorithms are an interdisciplinary research area comprising several paradigms inspired by the Darwinian principle of evolution. The current stage of research considers, among others, the following paradigms: Genetic Algorithms, Genetic Programming, Evolution Strategies, Differential Evolution, etc. in addition to other metaheuristic paradigms such as Particle Swarm Optimization or Ant Colony Optimization.

Applications of these optimization methods and others (e.g. see [3]), in civil engineering are welcomed, both for single-objective and multi-objective optimization problems [4].

Topics to be covered (but are not limited to) are:

- In the civil engineering area contents related to structural design (e.g.: concrete and/or steel structures, etc.)[5], geotechnics, acoustics, hydraulics, and infrastructure are welcome.

- In the construction management area related content can be project management, planning, coordination and control of projects, cost and time management, among others.

- Development aspects such as including surrogate modeling, parallelization, performance comparisons among methods, etc., are encouraged.

REFERENCES

[1] N. Lagaros, M Papadrakakis "Engineering and Applied Sciences Optimization". Computational Methods in Applied Sciences", Computational Methods in Applied Sciences, Springer, Vol. 38, 2015

[2] J. Magalhães-Mendes, D. Greiner, "Evolutionary Algorithms and Metaheuristics in Civil Engineering and Construction Management", Computational Methods in Applied Sciences, Springer, Vol. 39, 2015

[3] P. Neittaanmäki, S. Repin, T. Tuovinen, "Mathematical Modeling and Optimization of Complex Structures", Computational Methods in Applied Sciences, Springer, Vol. 40, 2016.

[4] C. Coello Coello, "Evolutionary Multi-Objective Optimization: A Historical View of the Field", IEEE Computational Intelligence Magazine, 1, 28-36 (2006).

[5] R. Kicinger, T. Arciszewski, KA. De Jong, "Evolutionary Computation and structural design: A survey of the state of the art", Computers & Structures, 83, 1943-1978 (2005).