



IEEE PES Working Group on Modern Heuristic Optimization

2018 PANEL & COMPETITION:

“Emerging heuristic optimization algorithms for operational planning of sustainable electrical power systems”

The operational planning of sustainable electrical power systems is facing higher stochasticity introduced by massive integration of variable renewable generation and the diversification of the sources for flexibility in highly interactive energy markets and multi-energy sector coupling. Therefore, the scheduling problems involved in operational planning need consideration of non-linear models, probabilistic models, and a large number of decision variables. This entails mathematically complex and computationally expensive formulations, which cannot be tackled by classical optimization tools.

This panel and competition, to be held at the 2018 IEEE PES General Meeting, introduces two benchmark problems (also denoted as optimization test beds):

Test bed 1: Stochastic OPF in Presence of Renewable Energy and Controllable Loads.

Developers: Sergio Rivera (Universidad Nacional de Colombia), Ameena Saad Al-Sumaiti (Masdar Institute, Khalifa University of Science and Technology), Diego Rodriguez (GERS USA LLC), Manuel Gers (GERS USA LLC), José Rueda (Delft University of Technology), Kwang Y. Lee (Baylor University), and István Erlich (University Duisburg-Essen).

Please refer to the following material:

- **02_Test_Bed_A_StochasticOPF_2018_Guidelines.pdf:** Detailed description of the test bed, implementation, and material to be

submitted to srriverar@unal.edu.co and j.l.ruedatorres@tudelft.nl, by 20 March 2018.

- **02_Test_Bed_A_StochasticOPF_2018.zip:** Matlab Codes (for problem evaluation) to be used in your implementation. You only have to work in your algorithm, which can call these codes.

Test bed 2: Dynamic OPF in Presence of Renewable Energy and Electric Vehicles.

Developers: Sergio Rivera (Universidad Nacional de Colombia), Ameena Saad Al-Sumaiti (Masdar Institute, Khalifa University of Science and Technology), Camilo Cortes (Universidad Nacional de Colombia), José Rueda (Delft University of Technology), Kwang Y. Lee (Baylor University), and István Erlich (University Duisburg-Essen).

Please refer to the following material:

- **03_Test_Bed_B_DynamicOPF_2018_Guidelines.pdf:** Detailed description of the test bed, implementation, and material to be submitted to srriverar@unal.edu.co and j.l.ruedatorres@tudelft.nl, by 20 March 2018.
- **03_Test_Bed_B_DynamicOPF_2018.zip:** Matlab Codes (for problem evaluation) to be used in your implementation. You only have to work in your algorithm, which can call these codes.

Evaluation criterion

Based on the submitted results (saved as txt files by using the provided codes), a ranking index is established, which accounts for the statistics of the best fitness value f_{best} obtained for each problem within the specified maximum number of function evaluations in each of the 31 runs considered for the competition. Thus, the success achieved for a single case (also denoted as scenario) is quantified as:

$$\text{Score} = \text{mean}(f_{best})$$

where mean stands for mean value.

The total score is calculated as the sum of the individual scores corresponding to the cases (scenarios) belonging to the above indicated test beds.

The organizers will announce the codes together with a comparative analysis based on the provided results by 20 April 2018 at <http://sites.ieee.org/psace-mho/2018-operational-planning-of-sustainable-electrical-power-systems-competition-panel/>. **The first three ranked algorithms** will be selected for presentation at the panel, for which only PowerPoint presentations are required.

Please consider that the IEEE PES Working Group on Modern Heuristic Optimization does not provide any financial support to attend the 2018 IEEE PES General Meeting.

All interested participants are encouraged to send an email to j.l.ruedatorres@tudelft.nl by 20 January 2018, indicating their names, affiliation, and the algorithm to be used.

Panel Organizers:

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Dr. Sergio Rivera
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Important dates:

Call for competition: **4 January 2018**

Confirmation of participation: **20 January 2018**

Submission of results and codes: **20 March 2018**

Announcement of best three ranked algorithms: **20 April 2018**

2018 IEEE PES General meeting: **5-10 August 2018**