

Stack-Test – Development of EU-wide uniform performance test schemes for PEM fuel cell stacks

Test Program 2.05 – Optimization of Operating Parameters

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Objective of the Test Program:

To experimentally find a set of externally-established test input parameters (TIPs), at which the PEMFC stack performance at a given constant load will be the best possible.

General Methodology:

An extremum of a scalar performance function of seven TIPs: T_{stack} , λ_{fuel} , λ_{ox} , RH_{fuel} , RH_{ox} , p_{fuel} , and p_{ox} is searched for using the Nelder-Mead (simplex search) algorithm*. The performance function is evaluated at a constant stack load as a steady-state value corresponding to a given set of the TIPs' values. The algorithm creates and transforms a simplex, the vertices of which are the sets of TIPs, by replacing the worst vertex with a better one in every iteration.

* http://www.scholarpedia.org/article/Nelder-Mead_algorithm

Test Modules Used:

- 2.00 – Stack-Test Master Document
- 2.14 – Continuous Operation at Constant Load
- 2.18 – Electrochemical Methods (optional)