Study of the impact of various parameters on H+SOFC performances

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Abstract:

The results presented in this article are based on extensive research conducted in the field of mathematical modeling and digital simulations. These works concerned the construction of a new mathematical proton conducting solid oxide fuel cell model, the model of which was based on reduced order approach [1]. Now, we are trying to use the developed model to identify the operational characteristics of H+SOFC. The validation of the model was based on the results of experimental research taken from the literature [2,3]. In experimental research, the practical applications of such devices are largely neglected. Therefore, in the first step, optimization of the fuel cell operating parameters was signed in terms of achievable performance indicators such as efficiency, power density, current density and others. The optimization was based on the Box method [4] available in the used software [5]. This method concerns the search for the maximum of the general nonlinear function of several variables within a limited area. This method is more effective than other methods when the optimum lies within one or more constraints. The algorithm itself is based on the Simplex method from which it was evolved.

Biography:

Jaroslaw Milewski is a doctor of engineering, associate professor at Warsaw University of Technology, Faculty of Power and Aeronautical Engineering, Institute of Heat Engineering. He is Head of Power Division at the Institute of Heat Engineering, Editor-in-Chief of Journal of Power Technologies, and a Member of Editorial Board of Journal of Applied Energy. He has an experience in research of fuel cells (Molten Carbonate Fuel Cells–MCFC and Solid Oxide Fuel Cell–SOFC) and other power sources, hybrid systems, advanced power systems (hydrogen based) and steam/gas turbine power generation systems. He has definite experience with cooperation with power engineering industry. He is an author and a co-author of 200+ publications and 4+ patents. He teaches students in the fields of: turbomachinery, theory of fluid flow machinery, environment protection, numerical tools in power plant simulations, hybrid systems, and others.

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