An integrated sofc plant dynamic model for power systems simulation

Padulles J., Ault G.W., McDonald J.R. (2000) An integrated SOFC plant dynamic model for power systems simulation. Journal of Power Sources 86, 495-500. Article Google Scholar Patankar S.V. (1980) Numerical Heat Transfer and Fluid Flow. Series in Computational Methods in Mechanics and Thermal Sciences, W.J. Winkowycz and E.M. Sparrow (Eds ...

As an example, a dynamic model for a 677 MW coal- and gas-fired power plant has been built with MATLAB and SIMULINK. Every power plant component was modelled using mainly physical modelling techniques and a whole-plant model can easily be configured by graphically linking the standard components by steam and gas flows, as in physical processes.

An integrated SOFC plant dynamic model for power systems simulation. J. Power Sources 2000, 86, 495-500. [Google Scholar] Li, Y.H.; Choi, S.S.; Rajakaruna, S. An analysis of the control and operation of a solid oxide fuel-cell power plant in an isolated system. IEEE Trans. Energy Convers. 2005, 20, 381-387. [Google ...

The dynamic model given by Padullés et al. [5] included the species dynamics on stack-level the first time. Zhu and Tomsovic [6] adopted the model of Padullés et al. [5] for analyzing the load-following performance of microturbines and fuel cells. Sedghisigarchi and Feliachi [7] combined Achenbachs heat transfer dynamics and Padullés" species dynamics, ...

The effectiveness of the proposed model is tested on three-machine power system integrated with the single SOFC power plant. The time-domain simulation results are promising and illustrate the effectiveness of the proposed stabilizers.

An integrated SOFC plant dynamic model for power systems simulation J. Power Sources 86 495-500 2000. Crossref. Google Scholar. 4. Zhu Y. and Tomsovic K. Development of models for analyzing the load-following performance of microturbines and fuel cells Electr. Power Syst. Res. 62 1-11 2002.

In this work a flexible and modular dynamic model of a SOFC stack has been developed which can be used as a building block for the modeling of integrated SOFC systems. ... a combined plant or a SOFC system integrated with a gasifier. Appendix A. Model parameters ... H. van Putten, P. Colonna, Dynamic simulation of a biomass-fired steam power ...

The design process of a SOFC plant dynamic model for a power systems simulation (PSS) commercial software package has revealed the trade-off between the satisfaction of the network dynamic requirements and a safe and durable cell operation that the plant controller should implement. This paper describes the initial fuel cell stack and power conditioner modelling ...

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The poster focuses on the Dynamic simulation of a marine SOFC power plant. If you want to learn more, find poster A1208 on Thursday, July 4, 2024, from 13:15 to 15:00 at EFCF 2024. The objective of the research presented is to evaluate how an SOFC power plant can be effectively integrated into seagoing ships to reduce emissions.

DOI: 10.1016/J.ENERGY.2018.02.068 Corpus ID: 115287646; A mathematical model of SOFC power plant for dynamic simulation of multi-machine power systems @article{Safari2018AMM, title={A mathematical model of SOFC power plant for dynamic simulation of multi-machine power systems}, author={Amin Safari and Hossein Shahsavari ...

Second, a localized model of the grid-connected SOFC power plant is proposed. This localized model can be used for the design of a power system stabilizer attached to the SOFC power plant to improve power system small-signal stability. The design proposed is simple because establishment of the localized model does not need to obtain and ...

An improved one-dimensional dynamic model of a tubular SOFC stack capable of system simulation in the virtual test bed (VTB) simulation environment is presented in this paper. This model is based on the electrochemical and thermal modeling, accounting for the voltage losses and temperature dynamics. ... An integrated SOFC plant dynamic model ...

A one-dimensional transient model of a tubular solid oxide fuel cell stack is proposed in this paper. The model developed in the virtual test bed (VTB) computational environment is capable of dynamic system simulation. This model is based on the electrochemical and thermal modeling, accounting for the voltage losses and temperature dynamics. The ...

Kattke et al. modeled a highly integrated SOFC-based system with the 3D approach combined with a 1D model of a tubular SOFC stack. In the work, a quasi-one dimensional model was used to simulate the balance of plant (BoP) components, catalytic partial oxidation fuel processor, and the tail gas combustor. ... Development of a simulation tool for ...

Based on the requirement for a high-temperature environment, the SOFC stand-alone power system should take full advantage of the heat from electrochemical reactions to achieve self-sustainability and promote efficiency [5].Therefore, the hydrogen-fueled SOFC system proposed in this paper is consist of the SOFC stack, the control system, and the ...

of dynamic stability analysis and control of SOFC power plant was described in the literature13-14. This study develops a modeling approach to reproduce the dynamic behaviour of a proof-of-concept CHP system based on two-stage SOFC stacks. An integrated system, in which two SOFC stacks are the core elements of

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Their spread is favoured by the development of proper simulation tools that allow system design optimization and control in real-time operations. ... analysis, J. Eng. Gas Turbines Power 122 (27) (2000) 27-35. [12] J. Padullés, G.W. Ault, J.R. McDonald, An integrated SOFC plant dynamic model for power systems simulation, J. Power Sour. 86 (1 ...

To determine the optimal SOFC/GT system design Czero began with our standard approach of developing a high-fidelity physics-based dynamic model of the system. This dynamic plant model was built in MATLAB Simulink using an internally developed block set and featured tracking of nine individual species, real gas properties (NIST REFPROP), mixture ...

(DOI: 10.1016/S0378-7753(99)00430-9) This article is published in Journal of Power Sources.The article was published on 2000-03-01. It has received 575 citations till now. The article focuses on the topics: Power conditioner & Electric power system.

A simplified dynamic model of an SOFC/Gas Turbine System is presented. ... is a rare case of validation of an integrated system. Recent component level modelling updates have been proposed by [28], where focus is placed on ... A mathematical model of SOFC power plant for dynamic simulation of multi-machine power systems. Energy, 149 (2018 ...

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