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Nota di contenuto	Molten Carbonate Fuel Cells; Contents; Preface; List of Contributors; Part I Design and Operation; 1 MTU's Carbonate Fuel Cell HotModule; 1.1 The Significance of Fuel Cells; 1.2 Basic Statements of Power Production and Combined Heat and Power Systems; 1.3 Fuels for Fuel Cells; 1.3.1 Fuels Containing Gaseous Hydrocarbons; 1.3.2 Synthesis Gases; 1.3.3 Group of Gasified Hydrocarbons; 1.3.4 Secondary Fuel; 1.4 Why Molten Carbonate Fuel Cells; 1.5 The Carbonate Fuel Cell and its Function; 1.6 Optimisation by Integration: The HotModule Concept; 1.7 Manufacturing 1.8 Advantages of the MCFC and its Utilization in Power Plants1.8.1 Electrical Efficiency; 1.8.2 Modularity; 1.8.3 Inherent Safety; 1.8.4 Environmentally Friendly - Pollution Free; 1.8.5 Silent; 1.9 History; 1.9.1 The European MCFC Development Consortium; 1.9.2 Continuing of the HotModule Development at MTU CFC Solutions; 1.10 Possible Applications of MCFC Systems; 1.10.1 Different Applications Using Different Fuels; 1.10.2 Different Applications Using the Different

Products of the MCFC System; 1.11 Economical Impacts; 2 Operational Experiences
2.1 Combined Heat and Power Plant of the Company IPF in Magdeburg2.2 The HotModule in Magdeburg; 2.3 Operation Experience; 2.4 Results and Outlook; Part II Model-based Process Analysis; 3 MCFC Reference Model; 3.1 Model Hierarchy; 3.2 General; 3.3 Model Equations; 3.3.1 Indirect Internal Reformer; 3.3.2 Anode Channel; 3.3.3 Combustion Chamber; 3.3.4 Reversal Chamber; 3.3.5 Cathode Channels; 3.3.6 Electrode Pores; 3.3.7 Solid Phase; 3.3.8 Electric Potential; 3.3.9 Reaction Kinetics; 3.3.10 Thermodynamics; 3.4 Summary; Bibliography; 4 Index Analysis of Models; 4.1 Differential Time Index
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5.1.7 Measuring Campaigns5.2 Strategy for Parameter Estimation; 5.2.1 Determination of Relevant Parameters; 5.2.2 Balancing of the Fuel Cell Plant; 5.2.3 Sensitivity Analysis; 5.2.4 Parameter Estimation for a Single Load Case; 5.2.5 Parameter Estimation for the Whole Operating Range; 5.2.6 Temperature Dynamics; 5.3 Results of the Parameter Identification; 5.3.1 Steady State Measurements; 5.3.2 Plant Balancing and Error Minimisation; 5.3.3 Parameter Estimation; 5.3.4 Dynamic Measurements; 5.3.5 Estimation of the Solid Heat Capacity; 5.3.6 Evaluation of the Results; 5.4 Summary; Bibliography
6 Steady State and Dynamic Process Analysis

Sommario/riassunto

Adopting a unique, integrated engineering approach, this text simultaneously covers all aspects of design and operation, process analysis, optimization, monitoring and control. It clearly presents the multiple advantages of molten carbonate fuel cells for the efficient conversion of energy, and also includes recent developments in this innovative technology. The whole is rounded off by an appendix featuring benchmark problems with equations and parameters.Vital reading for process, chemical and power engineers, as well as those working in power technology, chemists and electrochemists, mat