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The simulation is done using the two-phase Darcy law (TPDL) module of COMSOL (COMSOL Multiphysics ... established in 2008 by the Ministry of Education, Govt. of India (formerly: Ministry ...

A new understanding of patterns in fluid flow

The serpentinite layer then allows continuous free-fluid flow toward the corner of the mantle wedge, presenting possible mechanisms for the deep nonvolcanic tremors in the forearc mantle. Upon ...

Role of warm subduction in the seismological properties of the forearc mantle: An example from southwest Japan

4 Center of Physical Education and Sport, State University of Londrina (UEL), Londrina, Parana, Brazil Background The temporal and insular cortex (TC, IC) have been associated with autonomic nervous ...

Brain stimulation modulates the autonomic nervous system, rating of perceived exertion and performance during maximal exercise

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Recent research and development in the field of high-current circuit breaker technology are devoted to meeting two challenges: the environmental compatibility and new demands on electrical grids caused by the increasing use of renewable energies. Electric arcs in gases or a vacuum are the key component in the technology at present and will play a key role also in future concepts, e.g., for hybrid and fast switching required for high-voltage direct-current (HVDC) transmission systems. In addition, the replacement of the environmentally harmful SF6 in gas breakers and gas-insulated switchgear is an actual issue. This Special Issue comprises eight peer-reviewed papers, which address recent studies of switching arcs and electrical insulation at high and medium voltage. Three papers consider issues of the replacement of the environmentally harmful SF6 by CO2 in high-voltage gas circuit breakers. One paper deals with fast switching in air with relevance for hybrid fault current limiters and hybrid HVDC interrupters. The other four papers illustrate actual research on vacuum current breakers as an additional option for environmentally compatible switchgear; fundamental studies of the vacuum arc ignition, as well as concepts for the use of vacuum arcs for DC interruption.

Alexey Ivanov investigates the application of a silicon anodization process as a three-dimensional structuring technique, where silicon is transformed into porous silicon as a sacrificial layer or directly dissolved in electropolishing regime. The work contains a detailed state of the art, experimental studies and modeling of the process for basic shape controlling techniques. Limitations of the developed FEM model with secondary current distribution are discussed.

This book discusses surrogate modeling of high-frequency structures including antenna and microwave components. The focus is on constrained or performance-driven surrogates. The presented techniques aim at addressing the limitations of conventional modeling methods, pertinent to the issues of dimensionality and parameter ranges that need to be covered by the surrogate to ensure its design utility. Within performance-driven methodologies, mitigation of these problems is achieved through appropriate confinement of the model domain, focused on the regions promising from the point of view of the relevant design objectives. This enables the construction of reliable surrogates at a fraction of cost required by conventional methods, and to accomplish the modeling tasks where other techniques routinely fail. The book provides a broad selection of specific frameworks, extensively illustrated using examples of real-world microwave and antenna structures along with numerous design examples. Furthermore, the book contains introductory material on data-

driven and physics-based surrogates. The book will be useful for the readers working in the area of high-frequency electronics, including microwave engineering, antenna design, microwave photonics, magnetism, especially those that utilize electromagnetic (EM) simulation models in their daily routines. Covers performance-driven and constrained modeling methods, not available in other books to date; Discusses of a wide range of practical case studies including a variety of microwave and antenna structures; Includes design applications of the presented modeling frameworks, including single- and multi-objective parametric optimization.

This PhD thesis investigates the effectiveness of drainage measures with respect to two particularly important problems associated with tunnelling through water-bearing, weak ground: the stability of the tunnel face and the stability and deformation of grouting bodies. Water is an adverse factor with respect to the stability and deformation of underground structures due to the pore water pressure and the seepage forces associated with seepage flow towards the tunnel. Drainage boreholes reduce the pore water pressure and the seepage forces in the vicinity of the cavity. Furthermore, loss of pore water pressure increases the effective stresses and thus the shearing resistance of the ground („consolidation "), which is favourable in terms the deformation occurring during and after tunnelling. The goal of the PhD thesis is to elaborate a more detailed understanding of the interrelationships between drainage measures and the stability of the tunnel face and grouting bodies. The main objectives of the investigations relating to the tunnel face are: 1. analysis of face stability through limit equilibrium computations taking account of the numerically determined seepage flow conditions prevailing in the ground after the implementation of drainage measures; 2. systematic investigation of tunnel face stability considering several different drainage layouts and working out designnomograms; 3. consideration of a series of aspects limiting pore pressure relief and thus the effectiveness of drainage measures and their impact on face stability. The main objectives of the investigations with regard to grouting bodies are: 1. a study of the stabilizing effect of the virtual case of ideal drainage on tunnel support and plastification in grouted fault zones in plane strain conditions; 2. a comparison with the stabilizing effect of real drainage layouts, i.e. when considering pore pressure relief due to specific drainage borehole arrangements; 3. application of the drainage measure both before and after the injection works. In summary, the contribution of this PhD thesis is the detailed investigation of the static effects of drainage measures during tunnelling in water-bearing ground with respect to the stability of the tunnel face and the grouting body as well as the supply of design aids capable of providing a quick assessment of face stability when considering a number of advance drainage schemes.

Direct Natural Gas Conversion to Value-Added Chemicals comprehensively discusses all major aspects of natural gas conversion and introduces a broad spectrum of recent technological developments. Specifically, the book describes heterogeneous and homogeneous catalysis, microwave-assisted conversion, non-thermal plasma conversion, electrochemical conversion, and novel chemical looping conversion approaches. Provides an excellent benchmark resource for the industry and academics Appeals to experienced researchers as well as newcomers to the field, despite the variety of contributing authors and the complexity of the material covered Includes all aspects of direct natural gas conversion: fundamental chemistry, different routes of conversion, catalysts, catalyst deactivation, reaction engineering, novel conversion concepts, thermodynamics, heat and mass transfer issues, system design, and recent research and development Discusses new developments in natural gas conversion and future challenges and opportunities This book is as an excellent

resource for advanced students, technology developers, and researchers in chemical engineering, industrial chemistry, and others interested in the conversion of natural gas.

Nanostructured Materials for Next-Generation Energy Storage and Conversion: Photovoltaic and Solar Energy, is volume 4 of a 4-volume series on sustainable energy. Photovoltaic and Solar Energy while being a comprehensive reference work, is written with minimal jargon related to various aspects of solar energy and energy policies. It is authored by leading experts in the field, and lays out theory, practice, and simulation studies related to solar energy and allied applications including policy, economic and technological challenges. Topics covered include: introduction to solar energy, fundamentals of solar radiation, heat transfer, thermal collection and conversion, solar economy, heating, cooling, dehumidification systems, power and process heat, solar power conversion, policy and applications pertinent to solar energy as viable alternatives to fossil fuels. The aim of the book is to present all the information necessary for the design and analysis of solar energy systems for engineers, material scientists, economics, policy analysts, graduate students, senior undergraduates, solar energy practitioner, as well as policy or lawmakers in the field of energy policy, international energy trade, and libraries which house technical handbooks related to energy, energy policy and applications.

This book on hollow fiber contractors presents an up-to-date compilation of the latest developments and milestones in this membrane technology. Hollow Fiber Membrane Contactors: Module Fabrication, Design and Operation, and Potential Applications provides a comprehensive discussion of hollow fiber membrane applications (including a few case studies) in biotechnology, chemical, food, and nuclear engineering. The chapters in this book have been classified using the following, based on different ways of contacting fluids with each other: Gas-liquid contacting; Liquid-liquid contacting; Supported liquid membrane; Supported gas membrane; Fluid-fluid contacting. Other features include: Discusses using non-dispersive solvent extraction, hollow fiber strip dispersion, hollow fiber supported liquid membranes and role of process intensification in integrated use of these processes Provides technical and economic perspectives with several case studies related to specific scenarios Demonstrates module fabrication, design, operation and maintenance of hollow fiber contactors for different applications and performance Presents discussion on newer concepts like membrane emulsification, membrane nanoprecipitation, membrane crystallization and membrane condenser Special focus on emerging areas such as the use of hollow fiber contactor in back end of nuclear fuel cycle, membrane distillation, dehumidification of air and gas absorption and stripping Discusses theoretical analysis including computational modeling of different hollow fiber membrane processes, and presents emphasis on newly developed area of hollow fiber membrane based analytical techniques Presents discussion on upcoming area dealing with hollow fiber contactors-based technology in fermentation and enzymatic transformation and in chiral separations This book is equally suited for newcomers to the field, as well as for engineers and scientists that have basic knowledge in this field but are interested in obtaining more information about specific future applications.

The aim of Biodental Engineering is to solidify knowledge of bioengineering applied to dentistry. Dentistry is a branch of medicine with its own peculiarities and very diverse areas of action, and in recent years multiple new techniques and technologies have been introduced.This book is a collection of keynote lectures and full papers from Bio