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Nonlinearity in Energy Harvesting Systems
Micro- and Nanoscale Applications
This book is a single-source guide to nonlinearity and nonlinear techniques in energy harvesting, with a focus on vibration energy harvesters for micro and nanoscale applications. The authors demonstrate that whereas nonlinearity was avoided as an undesirable phenomenon in early energy harvesters, now it can be used as an essential part of these systems. Readers will benefit from an overview of nonlinear techniques and applications, as well as deeper insight into methods of analysis and modeling of energy harvesters, employing different nonlinearities. The role of nonlinearity due to different aspects of an energy harvester is discussed, including nonlinearity due to[...]
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Supported Layered Double Hydroxides as CO2 Adsorbents for Sorption-enhanced H2 Production

This thesis presents a combination of material synthesis and characterization with process modeling. In it, the CO2 adsorption properties of hydrotalcites are enhanced through the production of novel supported hybrids (carbon nanotubes and graphene oxide) and the promotion with alkali metals. Hydrogen is regarded as a sustainable energy carrier, since the end users produce no carbon emissions. However, given that most of the hydrogen produced worldwide comes from fossil fuels, its potential as a carbon-free alternative depends on the ability to capture the carbon dioxide released during manufacture. Sorption-enhanced hydrogen production, in which CO2 is removed as it is formed, can[...]

Impact of Climate Change on Hydro-Energy Potential
A MCDM and Neural Network Approach

This Brief presents the impact of climatic abnormalities on hydropower potential of different regions of the World. In this regard, multi-criteria decision making and neural network are used to predict the impact of the change cognitively by an index. The results from the study show that the hydro-energy potential of the Asian region is mostly vulnerable with respect to other regions of the World. The model results also encourage further application of the index to analyse the impact of climate change on potential of hydro-energy.

Exploration and Production of Oceanic Natural Gas Hydrate
Critical Factors for Commercialization

This book describes aspects of the natural gas hydrate (NGH) system that offer opportunities for the innovative application of existing technology and development of new technology that could dramatically lower the cost of NGH exploration and production. It is written for energy industry professionals and those concerned with energy choices and efficiencies at a university graduate level. The NGH resource is compared with physical, environmental, and commercial aspects of other gas resources. The authors’ theme is that natural gas can provide for base and peak load energy demands during the transition to and possibly
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Hydropower is found to be one of the most reliable and inexpensive options for renewable energy which was now widely been adopted by many countries to substitute fossil fuel sources. This Brief highlights the impact of climate change on hydropower plants, especially on the turbine design, as turbines are responsible for optimal conversion and regular energy production. The vulnerability of turbines is analyzed with the help of Artificial Neural Networks, followed by Multi Criteria Decision Making methods for development of intelligent indices to represent the level of vulnerability of turbines due to the change in climate.

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This Brief identifies various aspects of energy challenges faced by the Chinese central/local governments, and also provides an opportunity to study how best to achieve green growth and a low-carbon transition in a developing country like China. The progress of China’s carbon mitigation policies also has significant impacts on the on-going international climate change negotiations. Therefore, both policymakers and decision makers in China and other countries can benefit from studying the challenges and opportunities in China’s energy development.


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