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Nanofluid applications in renewable energy sources

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One of the great technological challenges in 21st century is the development of renewable energy technologies due to serious problems related with the production and use of energy. A new promising area of research grows rapidly which is called nanotechnology is considered nowadays as one of the most recommended choices to solve this problem. This review aims to introduce several significant applications of nanotechnology in renewable energy systems. Papers reviewed including theoretical and experimental works related with nanotechnology applications in solar, hydrogen, wind and biomass, geothermal and tidal energies. A lot of literature is reviewed and summarized carefully in useful tables to give a panoramic overview about the role of nanotechnology in improving the various sources of renewable energies. We think that this paper can be considered as an important bridge between nanotechnology and all available kinds of renewable energies. From the other side, further researches are required to study the effect of nanotechnology to enhance the renewable energy industry especially in geothermal, wind and tidal energies, since the available papers in these fields are limited.

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Dense wireless sensor networks: Exploiting interference for wireless energy harvesting in bidirectional communication

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The introduction of new communication paradigms such as Machine to Machine and Internet of Things, results in the rapid deployment of large-scale dense wireless sensor networks (WSNs). Although the increasing density raises important issues with regard to the interference, it facilitates the wireless energy harvesting (WEH) of the transmissions providing significant benefits for the network lifetime. In addition, the current trend for distributed knowledge in WSNs stresses the need for local information exchange and bidirectional communication. In this talk, we will explain the employment of stochastic geometry to study the performance of bidirectional communications in dense networks with WEH-enabled sensor nodes. In particular, we will focus on three different scenarios (direct, simple cooperative and network coding-aided cooperative) for data exchange and we provide analytical expressions for the probability of successful communication. Then, considering the importance of lifetime in conjunction with the successful data exchange, we will try to quantify the potential energy gains that can be achieved without compromising the provided quality of service. Finally, we plan to present extensive Monte-Carlo simulation results to highlight the importance of WEH in dense networks and identify the trade-offs between different communication scenarios.

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