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Sommario/riassunto

Polymer electrolyte membrane (PEM) fuel cells, which convert the chemical energy stored in hydrogen fuel directly and efficiently to electrical energy with water as the only by-product, have the potential to reduce our energy usage, pollutant emissions, and dependency on fossil fuels. Tremendous efforts have been made so far, particularly during the last couple of decades or so, on advancing the PEM fuel cell technology and fundamental research. In addition to the large number of research and review paper publications, several classic books have been published and are available in the market, which are primarily for introductory level readers. There are, however, very few books that address the graduate-level or advanced aspects of PEM fuel cells and are based on the first principles or conservation laws, dimensionless analysis, time constant evaluation, and numerical simulation by solving partial differential equations. There are abundant knowledge regarding flow, heat transfer, and mass transport in general engineering, which has been successfully extended to the water and thermal management of PEM fuel cells. This book contributes to this aspect of PEM fuel cell technology; that is, it focuses on the fundamental understanding of phenomena or processes involved in PEM fuel cells.