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*Special Issue Reprint*

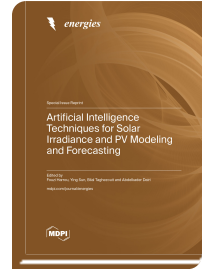
## **Artificial Intelligence Techniques for Solar Irradiance and PV Modeling and Forecasting**

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ISBN 978-3-7258-0067-4 (Hardback)

ISBN 978-3-7258-0068-1 (PDF)



Solar photovoltaic (PV) systems are pivotal and transformative technologies at the forefront of the global shift toward sustainable energy solutions. The primary challenge in solar energy production lies in the volatility and intermittency of PV system power generation, primarily due to unpredictable weather conditions. Additionally, PV systems face continuous exposure to various faults and anomalies that can impact their productivity and profitability. This Reprint centers on artificial intelligence (AI)-driven approaches for photovoltaic energy forecasting, modeling, and monitoring. The importance of AI methods in predicting, modeling, and detecting faults in PV systems is crucial in today's energy landscape. AI has emerged as a transformative force, addressing inherent challenges associated with solar energy production. The studies within this Reprint include empirical research across various subjects, encompassing machine learning and IoT for PV monitoring. The Reprint explores the effects of shading and dust on PV systems and presents AI-driven solutions. It also delves into PV modeling, optimization, and innovative strategies to enhance accuracy. In summary, this Reprint offers a concise yet comprehensive exploration of AI applications in solar energy, catering to researchers, practitioners, and educators in the field.



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