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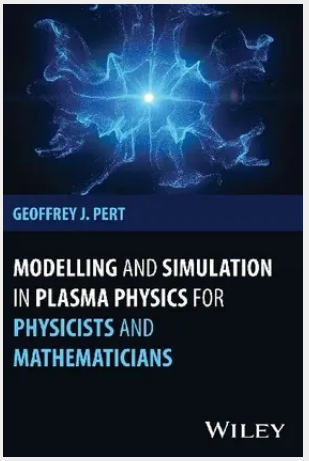
Modelling and Simulation in Plasma Physics for Physicists and Mathematicians



Unveiling the Secrets of Plasma Physics: A Practical Guide to Computational Simulations Plasma physics focuses on the most abundant state of matter in the universe, corresponding to ionized gas comprising ions and electrons. It can be created artificially and has a huge range of technological applications, from television displays to fusion energy research. Every application of plasma technology requires its own numerical solution to the complex physical and mathematical equations which govern the research field of plasma physics. Modelling and Simulation in Plasma Physics for Physicists and Mathematics offers an introduction to the principles of simulating plasma physics applications. It provides knowledge not only of the fundamental algorithms in computational fluid mechanics, but also their specific role in a plasma physics context. In addition, the book dissects the challenges and advancements, unveiling the delicate balance between accuracy and computational cost. Modelling and Simulation in Plasma Physics for Physicists and Mathematics readers will also find: - Cutting-edge computational insights where powerful simulations meet theoretical complexities, providing physicists and mathematicians a gateway to cutting-edge research. - An overview of programming language-agnostic code generation and the construction of adaptable models that resonate with the intricate dynamics of plasma physics, ensuring precision in every simulation. - Advanced simplification strategies, including time splitting, analytic models, averaged rates, and tabular material, offering scientists and engineers a roadmap to balance computational demands with scientific rigor. Modelling and Simulation in Plasma Physics for Physicists and Mathematics is ideal for plasma physicists, students, and engineers looking to work with plasma technologies.

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