

Scientific Writing in Engineering helps scientists, engineers, and students of all academic levels efficiently write scientific texts, such as scientific articles, conference papers, theses, reports, and research proposals. Drawing from long-time experience in academic teaching, the authors walk the readers through scientific writing step by step all the way from a blank first page to complete manuscripts. A comprehensive list of concise recommendations and more than one hundred examples, taken from real-life scientific texts, offer readers the chance to draw easy analogies between own scientific texts and the examples provided in this book. The elaborate recommendations, with emphasis on specific characteristics of writing in engineering sciences, serve as complete self-study material that renders the book a practical guide to effective scientific writing. Readers will enhance their knowledge on structuring scientific texts and will learn to avoid pitfalls in use of English, including grammatical and syntactical phenomena. Readers are given the opportunity to handle non-textual elements in scientific writing, such as figures as well as mathematical equations and formulas. Finally, the book provides detailed discussions on citing and referencing along with recommendations on formal electronic correspondence.

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SECOND EDITION

With a concise list of recommendations on effective scientific writing in engineering and more than one hundred examples taken from real-life scientific texts

Understanding and predicting the behavior of physical processes is frequently a fundamental requirement for efficient process management in several scientific and industrial fields. Gaining sufficient knowledge on current mechanisms of physical processes requires recreating instances of physical processes, which, on a physical scale, may be cumbersome and costly and, sometimes, even impossible. As a result, the need to predict outcomes of physical processes has diverted research attention to developing conceptual and mathematical representations of physical processes following the “modeling and simulation” paradigm, which has been adopted across a broad spectrum of scientific and industrial applications. Modeling essentially includes formulating parameters, conditions and principles characterizing the physical process under consideration, while simulation involves performing computations using the model parameters, conditions and principles to obtain an outcome, which is usually a prediction of the behavior of the physical process. Examples of applications of models used for simulation, and hereinafter termed “simulation models” can be found in industrial production, structural design, construction management, automotive design, and military defense operations. Despite the informative outcomes of modeling and simulation, modeling approximations entail an inevitable idealization of reality, rendering the real-world-level accuracy of modeling and simulation predictions practically infeasible. Moreover, coarse approximations or poor understanding of the physical principles underlying real-world phenomena may result in misleading modeling and simulation outcomes, which could cause management misjudgments or production errors. Hence, driven by such requirements for high-quality modeling and simulation, researchers have been focusing on assessing simulation models following the “verification and validation” concept. Verification refers to checks and audits performed during modeling and simulation to ensure the simulation model is correctly created by meeting a predefined set of simulation checks whether the correct simulation model has been created for the physical process under consideration. Verification and validation are closely related to quality control and quality assurance of products, services and information in industrial processes. For example, in software engineering, V&V of software packages is fundamental to software quality assurance. With respect to simulation model V&V, of primary importance to modelers is to ensure that simulation models deliver credible and accurate representations of reality. Unlike com-