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with natural risk studies; 1.3 Industrial safety, system reliability and probabilistic risk assessment (PRA); 1.3.1 The context of systems analysis; 1.3.2 Links and differences with structural reliability analysis; 1.3.3 The case of elaborate PRA (multi-state, dynamic); 1.3.4 Integrated probabilistic risk assessment (IPRA); 1.4 Modelling under uncertainty in metrology, environmental/sanitary assessment and numerical analysis
1.4.1 Uncertainty and sensitivity analysis (UASA)1.4.2 Specificities in metrology/industrial quality control; 1.4.3 Specificities in environmental/health impact assessment; 1.4.4 Numerical code qualification (NCQ), calibration and data assimilation; 1.5 Forecast and time-based modelling in weather, operations research, economics or finance; 1.6 Conclusion: The scope for generic modelling under risk and uncertainty; 1.6.1 Similar and dissimilar features in modelling, risk and uncertainty studies; 1.6.2 Limitations and challenges motivating a unified framework; References
2 A generic modelling framework2.1 The system under uncertainty; 2.2 Decisional quantities and goals of modelling under risk and uncertainty; 2.2.1 The key concept of risk measure or quantity of interest; 2.2.2 Salient goals of risk/uncertainty studies and decision-making; 2.3 Modelling under uncertainty: Building separate system and uncertainty models; 2.3.1 The need to go beyond direct statistics; 2.3.2 Basic system models; 2.3.3 Building a direct uncertainty model on variable inputs; 2.3.4 Developing the underlying epistemic/aleatory structure; 2.3.5 Summary
2.4 Modelling under uncertainty - the general case2.4.1 Phenomenological models under uncertainty and residual model error; 2.4.2 The model building process; 2.4.3 Combining system and uncertainty models into an integrated statistical estimation problem; 2.4.4 The combination of system and uncertainty models: A key information choice; 2.4.5 The predictive model combining system and uncertainty components; 2.5 Combining probabilistic and deterministic settings; 2.5.1 Preliminary comments about the interpretations of probabilistic uncertainty models
2.5.2 Mixed deterministic-probabilistic contexts

Sommario/riassunto

"This volume addresses a concern of very high relevance and growing interest for large industries or environmentalists: risk and uncertainty in complex systems. It gives new insight on the peculiar mathematical challenges generated by recent industrial safety or environmental control analysis, focusing on implementing decision theory choices related to risk and uncertainty analysis through statistical estimation and computation, in the presence of physical modeling and risk analysis. The result will lead statisticians and associated professionals to formulate and solve new challenges at the frontier between statistical modeling, physics, scientific computing, and risk analysis"--