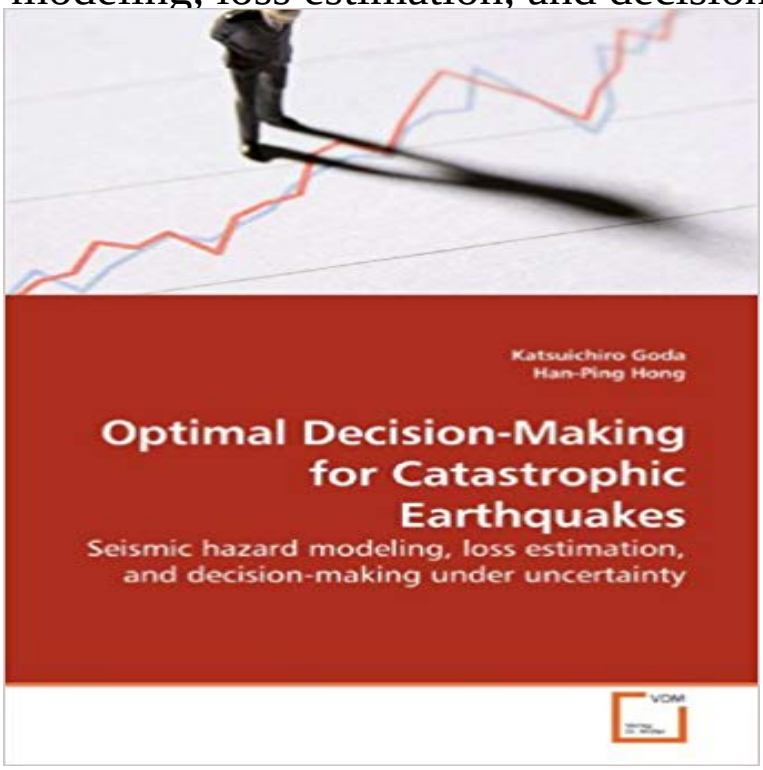
Optimal Decision-Making for Catastrophic Earthquakes: Seismic hazard modeling, loss estimation, and decision-making under uncertainty



Infrequent and large earthquakes cause damage to structures and infrastructure and result in catastrophic tangible and intangible seismic losses. For successful seismic disaster mitigation, it is essential to assess economic and societal losses quantitatively and to take the effects of people?s risk perception and risk attitudes towards low- probability high-consequence seismic risks into account. To address these issues, a simulation-based seismic risk model for buildings is developed by incorporating probabilistic seismic hazard analysis, spatial correlation of seismic effects at different sites, inelastic seismic demand estimation, reliability analysis, seismic loss estimation, and decision analysis. The developed model is applied to identify cost-effective and socially acceptable seismic design levels and to investigate the effects of risk perception of decision makers. The book also presents a novel application of a spatial correlation model of seismic excitations to highlight the impacts of spatially correlated seismic effects on multiple buildings. Implications of the findings for successful seismic risk management are discussed.

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