

Mohammed Ettouney and Sreenivas Alampalli: Multihazard considerations in civil infrastructure

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Roads, bridges, tunnels, buildings, dams, railways, towers, private residences, and many more facilities make up the extensive and complex framework of the infrastructure in modern societies. Increased frequency of disastrous events such as floods, hurricanes, and earthquakes point to the fragility of the infrastructure. In some instances, natural disasters wipe out entire neighborhoods; cause irreparable damage to property, and the civil infrastructure that is the encompassing framework of modern societies. Resilience of civil infrastructure systems will rely on the decision-making processes involved in multihazard design and mitigation approaches adopted by the owners of the infrastructure.

The book by Ettouney and Alampalli provides a comprehensive approach in dealing with multihazards in civil structures. The first two chapters correspond to general descriptions and classifications of multihazards, risks, exposure, and basic theories. The third chapter pertains to the structural analysis in relation to multihazards. It introduces the concept of interaction matrix, both for static as well as dynamic analysis scenarios. The fourth and fifth chapters describe the vulnerability and exposure of the infrastructures through several case studies. Probabilistic methods, i.e., Bayesian and Markov networks and their applications in terms of decision and uncertainty analysis in structural inspections and monitoring are described. Assessment of risk and resilience of infrastructure in

multihazard environment is provided in chapter six. Case studies in this chapter correspond to the assessment of multihazard risk in mass transit stations and tunnels. Chapter seven of the book responds to questions such as the acceptability of design in terms of risk. The basic concept behind the acceptability of risk in design is described as a function of the multihazard environment for individual cases under consideration. Chapter eight provides the interrelationship between hazards and their potential risk countermeasures. Interesting examples and case scenarios elucidate the various principles provided in this chapter. Examples include evaluation of annual risk of scour failure of existing bridges, and other topics corresponding to multiple risks, such as blast and seismic, floods and fire, etc. Methods for monitoring of risks and resilience of civil infrastructures are described in chapter nine. This chapter also provides tools for life cycle analysis in multihazard environments. The last chapter of the book provides a comprehensive list of applications, including modeling for multihazards, historical events, and case studies.

This book will serve as a valuable resource and a handbook for those involved in monitoring and inspection of infrastructures. It is especially useful for engineers considering analysis of infrastructure systems in multihazard environments.

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