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## Book Review

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**Earthquakes and Sustainable Infrastructure: Neo-Deterministic (NDSHA) Approach Guarantees Prevention Rather Than Cure**  
**by: Giuliano F. Panza, Vladimir G. Kossobokov, Efraim Laor and Benedetto De Vivo**  
**Published 2022**  
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The book *Earthquakes and Sustainable Infrastructure* clearly summarises the ‘state-of-the-art’ of the scientific knowledge on the well-known neodeterministic approach for seismic hazard analysis (NDSHA).

Earthquakes nowadays represent a source of great concern around the world for potential significant losses that can suddenly plague a country.

In addition to economic losses, the human life itself is still threatened as demonstrated by the 1,260,000 fatalities and by the ten million serious injuries occurred in the last centuries due to seismic events. In recent years, the number of fatalities and significant losses following natural disasters worldwide has been rapidly growing. This is mainly due to the urbanisation, the growing world population and gross domestic product. These factors imply a concentration of people and goods, thus increasing their exposure to natural hazards more than in the past. In addition, the vulnerability of many structures and infrastructures is high, since retrofitting and rebuilding are time and money consuming processes.

In this context, seismic hazard analysis plays a key role under many points of view: from the design of new structures to the strengthening of the existing ones and on the risk and resilience assessment of structures and communities. Thus, the book presents and promotes the NDSHA approach as the currently most reliable method to ensure adequate seismic prevention, in contrast to the so-called probabilistic seismic hazard analysis (PSHA). In the NDSHA method, great importance is given to the definitive reliable definition of the maximum credible earthquake and to the detailed modelling of the shaking scenario, defined according to the requirements contained in technical standards for constructions such as the Italian NTC2018, with the aim of estimating the most significant bundle of acceleration histories that the structure might be called to face during its lifetime.

The book *Earthquakes and Sustainable Infrastructure* shows the advantages of NDSHA with respect to PSHA, with both scientific and practical engineering perspectives. The board of the Chapters’ Authors is composed by scientists and experts in

academia, disaster prevention and preparedness management, covering the fields of engineering, seismology, physics, geology, risk analysis and emergency management.

Significant emphasis is given to the need to adopt NDSHA for structural design since the use of PSHA may result in the design of unsafe buildings, or, at least, NDSHA should be officially adopted by current design codes (e.g., NTC2018) jointly with the existing PSHA approach. Such theses are supported by scientific evidence, that highlights the urgent need to upgrade how the seismic safety is nowadays intended. Authors show as the benefits coming from the adoption of the neodeterministic standard will lead not only to life safeguard, but also to a substantial reduction of economic losses.

With a view to prevention, at least infrastructures, public and strategic structures should be designed in such a way to resist to potential future high magnitude earthquake continuing to carry out their original function. A significant earthquake, compatible with the seismogenic characteristic of the area, may happen suddenly, at any moment, even if labelled as 'unlikely'. Under the neodeterministic point of view, the design parameters should consider representative this 'unlikely' event, and should not rely on the deceptive belief of knowing the exact rate of exceedance of a series of reference ground motion intensities. Design values derived from the PSHA approach are fixed from questionable political decisions, often not understood by practitioner and denied by events.

The book contains contributions from the scientific community all over the world, showing successful applications of the NDSHA in many countries as Italy, the USA, Central and South-Eastern Europe, Romania, Bulgaria, Republic of North Macedonia, Albania, Portugal, Spain, China, India, Pakistan, Iran, Bangladesh and Sumatra, all countries located in high seismically active areas around the globe.

Within the 30 chapters of the book, the history of the seismic hazard analysis is retraced, pointing out the evolution of the NDSHA and its undisputed value in the development of a safe and a sustainable society. A must-read book for scientist, engineers, administrators and risk managers.