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Risk, Resilience and Sustainability of Infrastructure under Multi-hazards

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Abstract. Decisions regarding design, assessment and maintenance of infrastructure should be supported by an integrated risk-, resilience- and sustainability-based life-cycle multi-objective optimization framework by considering, among other factors, the likelihood of successful performance and the total expected cost accrued over their entire life. The primary objective of this keynote lecture is to present a life-cycle multi-objective optimization framework for risk-, resilience- and sustainability-informed decision making for infrastructure under multi-hazards including corrosion, earthquake and climate change. Several important performance indicators such as risk, resilience and sustainability necessary to be implemented in the design, assessment and maintenance of infrastructure under single and multiple hazards are introduced. Bridges and bridge transportation networks are used to illustrate the application of the proposed approach.

Keywords: risk, resilience, sustainability, bridges, earthquake, corrosion, climate change, life-cycle

Biosketch

Dan M Frangopol is the inaugural holder of the Fazlur R. Khan Endowed Chair of Structural Engineering and Architecture at Lehigh University. He is recognized as a leader in the field of life-cycle engineering of civil and marine structures under various types of hazards. He is the Founding President of the *International Association for Bridge Maintenance and Safety (IABMAS)* and the *International Association for Life-Cycle Civil Engineering (IALCCE)*. He has authored/co-authored 4 books, more than 60 book chapters, and over 470 articles in archival journals including 14 prize winning papers. He is the Founding Editor of *Structure and Infrastructure Engineering*. Dr. Frangopol is the recipient of several awards from ASCE, IABSE, IASSAR and other professional organizations, such as the Newmark, Freudenthal, Housner, Croes, TY Lin, Khan and Thorpe Medals, the Ang, Howard, and Moisseiff Awards, and the Lifetime Achievement Award in Education (OPAL). He holds 4 honorary doctorates and 14 honorary professorships from major universities. He is a member of the US National Academy of Construction, a foreign member of the Canadian, Japan and Mexican Academy of Engineering, Royal Academy of Belgium, Academy of Europe (London), Romanian Academy and Romanian Academy of Technical Sciences, and a Distinguished Member of ASCE.