

SYSTEM RELIABILITY, RISK, LONGEVITY, SUSTAINABILITY AND OPTIMAL DECISION-MAKING

Emphasis on Marine Structures



DAN M. FRANGOPOL
SUNYONG KIM

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This book provides the concepts and methodologies of probabilistic structural performance assessments and predictions for deteriorating structures, with emphasis on marine structures and special consideration of system reliability, risk, longevity, sustainability, and optimal decision-making. It introduces a comprehensive framework for time-dependent structural performance analysis, incorporating maintenance strategies to estimate and/or extend service life of infrastructure systems. The integration of structural health monitoring highlights the pivotal role of data analytics in addressing uncertainties and optimizing service life management. Progressing from foundational theories to advanced optimization strategies for inspection, monitoring, and maintenance planning, this book, which is a valuable resource for students, engineers, researchers, decision-makers, and policymakers, critically addresses economic considerations through cost-benefit utility and information analysis. Additionally, the exploration of multi-objective optimization and optimal decision-making processes presents the intricate trade-offs involved in the stewardship of marine and civil infrastructure.

Dan M. Frangopol is the inaugural holder of the Fazlur R. Khan Endowed Chair of Structural Engineering and Architecture at Lehigh University. He is widely recognized as a leading educator and pioneer in the field of life-cycle civil engineering. His main research interests are in the development and application of probabilistic and optimization concepts and methods to civil and marine engineering. He is the Founder and Editor-in-Chief of *Structure and Infrastructure Engineering*. Dr. Frangopol has achieved membership in eight academies, holds five honorary doctorates and 14 honorary professorships, and is a Distinguished Member of ASCE. In 2023, ASCE established the Dan M. Frangopol Medal for Life-Cycle Engineering of Civil Structures.

Sunyong Kim is Professor of Civil Engineering in the Department of Civil and Environmental Engineering at Wonkwang University, South Korea. Under the supervision of Prof. Dan M. Frangopol, he earned a Ph.D. in Structural Engineering in 2011 from Lehigh University. Dr. Kim is the recipient of the 2014 ASCE J. James R. Croes Medal, the 2014 IABMAS Junior Prize, the 2018 IALCCE Junior Award, and the 2022 ASCE Arthur M. Wellington Prize. He is an editorial board member of several international peer-reviewed journals. Dr. Kim is a member of ASCE, the Executive Board of IALCCE, and the Executive Committee of IABMAS.

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