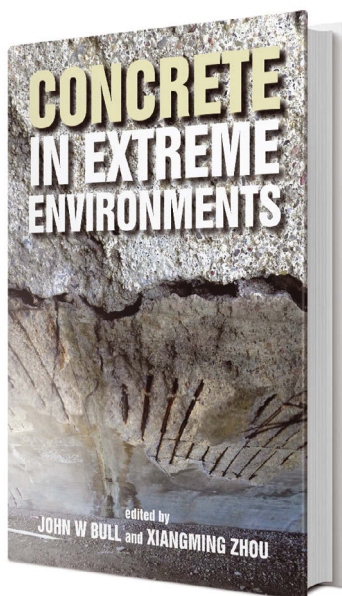


# Review

This book on the durability of concrete in harsh conditions will make an excellent reference work for designers, concludes **Long-yuan Li**.

## Concrete in extreme environments

**Editors:** John W. Bull and Xiangming Zhou  
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### DURABILITY OF CONCRETE CAN BE RELATED

to the severity of the environment, e.g. carbonation, chloride ingress and sulphate attack. This book introduces more harsh conditions, including hot saline and cold environments, cyclic fatigue, fire, H<sub>2</sub>S biogenic corrosion and radioactive containment.

It also discusses some real-world engineering examples, such as concrete in dams, reservoirs, frame buildings, nuclear containment and geothermal wells in China, Europe and New Zealand, offering first-hand experiences and insights regarding the design, production and utilisation of concrete under various different extreme conditions.

The book has nine chapters. After the introduction, Chapter 2 covers a series of case studies introducing extreme conditions related to hot saline environments, soft water leaching, thaumasite sulphate attack, acid attack, fire, abrasion, algae and mould growth. It sheds light on the response of concrete elements to chemical, physical and biological process.

A number of extreme events have occurred in China since the 1990s. The work presented in Chapter 3 is related to the investigation of the influence of seismic damage and extreme temperature variations on concrete dams in China.

Chapter 4 describes the numerical models used to simulate the progressive collapse of reinforced concrete buildings and applied in the design, vulnerability evaluation and strengthening of various structural typologies.

H<sub>2</sub>S biogenic corrosion is a growing problem for sewer owners as the evolution in water usage tends to increase H<sub>2</sub>S production parameters. Chapter 5 presents a broad review of the H<sub>2</sub>S biogenic corrosion process in sewer networks and the rationale behind the exceptional durability of calcium aluminate cements in this deterioration process.

Chapter 6 provides an in-depth introduction to concrete fatigue and offers a detailed elaboration relating to the influence of cyclic fatigue on concrete wind turbine towers with various damage models and monitoring technologies provided.

Chloride ingress in concrete from de-icing salts on roads is very common and has been widely investigated around the world. In Chapter 7 a prediction model is presented for describing chloride ingress in concrete exposed to a de-icing salt road environment. Guidelines for the application of the model in durability design are also provided.

The need for long-term storage of radioactive materials remains a challenge due to the lack of

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**IT IS A VERY USEFUL BOOK PRESENTING VARIOUS SCENARIOS AND CASES OF CONCRETE SUBJECTED TO A VARIETY OF HARSH AND EXTREME ENVIRONMENTS**

records regarding the prolonged durability of modern materials. Chapter 8 presents the evolution of corrosion parameters in El Cabril repository in Cordoba, Spain, obtained from a set of sensors installed in the structure in 1995. These include temperatures, corrosion rate, corrosion potential, electrical resistivity, local concrete strain, and oxygen availability.

Chapter 9 describes the reactions that occur on the hydrothermal treatment of Portland cement in geothermal wells, and the details of improving cement to counter CO<sub>2</sub>-induced carbonation and the mechanism of subsequent corrosion.

The book was written by a number of international experts who are actively working in the field of concrete materials. It is a very useful book presenting various scenarios and cases of concrete subjected to a variety of harsh and extreme environments, providing a global perspective.

The book will serve as an excellent reference book for designers, builders or owners of assets, as it presents some common traits of concrete subjected to extreme environments.

### Long-yuan Li

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Long-yuan Li is Professor of Structural Engineering at the University of Plymouth. His research interests are mainly related to concrete materials, including durability of reinforced concrete structures, geopolymer concrete, and fire safety of concrete structures. Professor Li has published over 165 technical papers in research journals and serves on the editorial board of the *Magazine of Concrete Research and Cement and Concrete Composites*.