

Special Issue

Symmetry Applied in Urban Water Resource Systems: Modeling, Control, and Optimization

Message from the Guest Editors

Rapid urban expansion, rising water demand, and increasing climate variability are placing growing pressure on urban water resources worldwide. In many regions, especially arid and semi-arid areas, declining groundwater levels, deteriorating water quality, and heightened exposure to extreme weather events are pushing conventional water management approaches to their limits. These challenges highlight the need for integrated, adaptive, and scientifically grounded strategies that promote system balance, resilience, and structural coherence. This Special Issue focuses on symmetry-based approaches to urban water resource development and management. Topics of interest include groundwater–surface water interactions, water quality and contamination risks, urban water supply and reuse systems, and climate-resilient infrastructure. Particular emphasis is placed on supply–demand balance, symmetric or near-symmetric network structures, and spatio-temporal equilibrium. Contributions employing mathematical modeling, optimization, remote sensing, environmental modeling, and data-driven methods, including machine learning, are especially welcome.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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