

SCIENCE CHINA Information Sciences Call for Papers

Special Topic: Intelligent Characterization and Modeling for Complex Systems



The study of complex systems—spanning from biological networks and socio-technical infrastructures to environmental ecosystems and advanced manufacturing processes—constitutes a cornerstone of modern scientific inquiry. These systems are inherently characterized by nonlinear interactions, emergent behavior, multiscale dynamics, and often high-dimensional, heterogeneous data, rendering them resistant to characterization and modeling via traditional reductionist or purely physics-based approaches. Recent transformative advances in artificial intelligence have inaugurated a new paradigm. Techniques in LLM, Agent AI, symbolic regression and graph neural networks offer unprecedented capabilities for extracting governing principles, identifying hidden state variables, and discovering compact, interpretable models directly from observational or experimental data. This special issue on "Intelligent Characterization and Modeling for Complex Systems" is dedicated to exploring this convergent frontier. It aims to highlight cutting-edge methodologies that leverage intelligent computational tools to unravel the structure, dynamics, and control of complex systems, thereby accelerating discovery, enhancing predictive fidelity, and enabling the design of more robust and adaptive systems across engineering, physical, biological, and social sciences. Contributions that bridge

theoretical innovation with practical applications, and that address foundational challenges such as interpretability, uncertainty quantification, and integration of prior knowledge, are of central importance to advancing the field.

This Special Issue invites original research articles, authoritative reviews, and benchmark studies that advance intelligent characterization and modeling of complex systems. We welcome contributions that develop fundamental theories, innovative methodologies, and integrative frameworks spanning multiple scales, domains, and data modalities.

Topics of interest include, but are not limited to:

- **Foundations of Intelligent Characterization and Modeling:** Fundamental principles and novel methodologies for representing trans-level and cross-scale structures, as well as dynamical functionalities, in complex systems.
- **Spatiotemporal Structure and Functional Analysis:** Quantitative analysis of spatiotemporal architectures, cross-scale coupling, nonlinear feedback, and their roles in functional realization.
- **Emergent Behavior and Meso-Scale Mechanisms:** Cooperative patterns, meso-scale phenomena, and generative mechanisms underlying intelligent emergence in multi-level systems.
- **Critical Transitions, Phase Reduction, and Nonlinear Dynamics:** Modeling, prediction, and control of critical transitions, resilience, phase reduction, and dynamics near tipping points in evolving stochastic systems.
- **High-Dimensional Coupling and Uncertainty Evolution:** Identification of strong and weak interactions, higher-order coupling, and uncertainty propagation in high-dimensional systems.
- **Data-Intelligent and Physics-Informed Stochastic Control:** Integration of artificial intelligence with physical modeling for robust, secure regulation of uncertain and infinite-dimensional systems.
- **Key Nodes, Network Structures, and Regulatory Mechanisms:** Identification and analysis of critical nodes, structural determinants, and intervention strategies in complex dynamical networks.
- **Digital-Intelligent Simulation Frameworks:** Cross-scale and cross-network simulation platforms supporting prediction, reasoning, and decision-making in complex systems.

Submission

The papers should be prepared using the SCIS template, and should be submitted online through the manuscript submission system of the SCIENCE CHINA Information Sciences. The submission website is <https://mc03.manuscriptcentral.com/scis>. You should choose **Special Topic: Intelligent Characterization and Modeling for Complex Systems**. Information and guidelines on preparation of manuscripts are available on the journal website: <http://scis.scichina.com>.

Important Dates

Submission deadline: **June 15, 2026**
First Round of Reviews: July 30, 2026
Final Acceptance: August 30, 2026
Publication: December 1, 2026

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