

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
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THE COMPLEXITY OF SPACE INFORMATION NETWORK

**Abstract**

The Space Information Network (SIN), which takes the satellite network as backbone, includes various space assets and related ground facilities that constitute a heterogeneous network system with the capabilities of space information acquisition, processing and transmission. Simultaneously, the SIN plays a more and more important role in the National Information Infrastructure. However, due to the diversity in the kinds and orbits of space assets, and the dynamic characteristics of inter-satellite and satellite-ground connections, the SIN is very complex in topological structure and highly sensitive to natural environment and human activities. To prevent the cascading failure phenomenon and improve the robustness of SIN, this paper summarizes three main characteristics of the SIN qualitatively and macroscopically, and proposes a methodological approach to analyze the complexity of SIN. Two types of complexity are studied: structural complexity and functional complexity. The structural topology is characterized using the language and symbols in graph theory. With the tool of complex network theories, the network characteristic parameters of SIN are provided, and the analysis results show that the SIN is a typical small-world network.