

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Interactive Presentations - IAF SPACE SYSTEMS SYMPOSIUM (IP)

Author: Dr. Yuzhu Zhang
National Space Science Center, Chinese Academy of Sciences, China, ngc7129@hotmail.com

Prof. Zhen Yang
CSSAR/CAS, China, yangzhen@nssc.ac.cn
Dr. Xiaodong Peng
National Space Science Center (NSSC), Chinese Academy of Sciences, China, pxd@nssc.ac.cn

AN AUTOMATIC MODEL-BASED REQUIREMENT DECOMPOSITION AND VERIFICATION
TOOL FOR SPACE MISSION CONCEPT DESIGN**Abstract**

With the continuous development of space exploration technology, the future space science mission is moving towards large-scale, high-precision, distributed and extreme operating environments, which poses great challenge for concurrent design and simulation. At present, the Concurrent Design and Simulation Center at National Space Science Center NSSC Chinese Academy of Sciences (CAS) has supported many space science projects, with the ability to do concurrent design, simulation and evaluation for space missions in Phase 0 and Phase A efficiently. However, during the process of requirement decomposition and verification, it is still highly relied on professional technicians and influenced by the experience of these experts and their knowledge base. It is hoped that the experiential knowledge of the existing experts in all disciplines, subsystems and general aspects in this process will be transformed into data which can be used by the computer. Based on these data and simulation models, feasible exploration schemes are given by computer algorithm with human-machine interaction assisted decision-making under the top-level scientific requirement during concept design. Then, the computer algorithm can learn from the existing missions and evolve. According to the notion above, our work is put into three parts: (1) model-based formal expression of empirical knowledge; (2) artificial intelligence reasoning; and (3) key point determination in the inference process. In this paper, we first introduce the current capability of the concurrent design and simulation platform at NSSC; then, give the notion of the automatic model-based requirement decomposition and verification; third, we put forward the detailed system design and implementation of our tool. Promising advantages and future outlook of this method are also presented in more detail.