

SPACE SYSTEMS SYMPOSIUM (D1)  
System Engineering Tools, Processes and Training (1) (3)

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## RESEARCH ON KEY ACTIVITIES RECOGNITION IN THE CONCURRENT DESIGN PROCESS

**Abstract**

In conceptual design phase, space science mission concurrent design process contains many domains and involves a lot of design activities. In parallel design environment, downstream design activities have already begun while upstream activities haven't been completed. This will inevitably bring couple iterations due to upstream uncompleted information. The couple iteration is the main reason for the design of complex. So it is important to clear activities couple relationship for successfully parallel design. And key activities recognition is important for the resource distribution and process programming. The design activities during space science mission design process and their relationships are analyze, and molded with design structure matrix (DSM). The DSM describes information transfer between the activities. Through DSM clustered analysis to recognition couple activities clusters. Then establish information evolution matrix (IEM) for each couple activities cluster to describe information evolution. Compute the eigenvalue and eigenvector of IEM. According to the eigenvalue and eigenvector, identify the key activities of the couple activities clusters. A space science mission is exemplified. A DSM consisting of 31 activities and information dependencies is constructed to represent the design process. The DSM is clustered and 4 coupled activities clusters and 16 serial activities clusters are partitioned. 4 information evolution matrixes (IEM) are established for each coupled activities clusters. The eigenvalue and eigenvector of IEM show the iteration process is convergent, and then key activities are recognized. The key activities need to be distributed more resources during the process.