

MICROGRAVITY SCIENCES AND PROCESSES (A2)  
Microgravity Processes onboard Large Space Platforms (7)

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RESEARCH OF IMPACT DYNAMICS MODELING BASED ON PROBE-CONE DOCKING  
MECHANISM

**Abstract**

Probe-cone mechanism is applied in the docking process of space stations by Russia. It is an old docking mechanism but never out of date. The effect of impact in the docking process is impossible to be avoided. In order to reduce the impact shock effect, the method which is widely used nowadays is using buffering mechanism. Most of us pay attention to the researches on buffering dynamics of docking mechanism, and discussing on the performance of buffering mechanism by dynamics modeling. But there is little research on impact mechanics during docking process. This paper is mainly to build impact dynamics model based on probe-cone docking mechanism by the theory of Lagrange analysis mechanics and Hertz impact model. The effect of inclined friction to docking impact is also concerned. Then the impact dynamics model is numerically simulated by using Matelab software. The curve of impact force time history and other parameters of the docking spacecrafts are obtained by modeling simulation. Finally, the results from dynamics modeling are compared with the results from the finite modeling and dynamic transient analysis software Patran/Dytran, and they agree with each other very well.