

# **A new numerical model for deployment process of inflatable aerodynamic decelerator based on the reverse modelling technique and control volume method**

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## **ABSTRACT**

The Inflatable Aerodynamic Decelerator (IAD) is a new type of re-entry and return technology in aerospace engineering. The structure is stored by folding and unfolded by inflating. The inflatable structure is used to generate air resistance. The numerical simulation can provide insights into deployment process for the IAD and the influence of structure deployment on the performance evaluation of entire structure. A challenge of building numerical modelling of the deployment for IAD is the building of folding structure, due to its complicate inflatable structure system composed of multi airbag rings, heat shield cover and connecting structures, therefore, the regular folding method in the numerical simulation for relatively simpler inflatable structures usually cannot handle the numerical simulation of IAD. In this paper, a new numerical model for deployment of IAD is proposed based on the reverse modelling technique for building folding structure and the control volume method for simulating deployment process. Firstly, the reverse modelling method is realized by applying loading on the unfolding structure, and then the deployment process is simulated by solving a dynamic problems based on the control volume method. The numerical calculation is based on the LS-DYNA software platform. The numerical examples are provided, and a good agreement is achieved by comparing the numerical results and experimental results.

## **REFERENCES**

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