

## SPACE DEBRIS SYMPOSIUM (A6)

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Author: Ms. Ying Lin

China Great Wall Industry Corporation(CGWIC), China, linying@cgwic.com

Mr. Wenzhe Li

China Great Wall Industry Corporation(CGWIC), China, liwz@cgwic.com

SMALL SATELLITES PROSPERITY: THE CRADLE OF LATEST SPACE TECHNOLOGY OR THE GRAVE OF DEBRIS-SYNDROME SPACE

**Abstract**

Small satellites (i.e., micro-satellite, nano-satellite, pico-satellite or small spacecraft within a constellation) and cluster launch services combination which efficiently performs a mix of academic, commercial, governmental and other earth-orbiting mission is contemporarily on a dramatic rise. With smaller satellites playing bigger roles, the potential risk of orbit and other on-orbit spacecraft will further expand the number of associated space debris, as smaller satellites generally have shorter life spans and lack of de-orbit system due to the constrains of its size and cost. Technical, legal and economic considerations have formed three main approaches dedicated to providing substantial solutions of controlling the augmentation of debris accumulation. However, even with the 'Voluntary Guideline' of IADC and UNCOPUOS system, the creation rate has still further outpaced the removal or de-orbit rate regarding to a wide margin.

This paper gives a briefly introduction to the contemporary small satellite development as well as the statistical analysis to the consequent increasing debris and, then, discusses methodologies of introducing dynamic mechanism of market-share liability as a tentative solution to minimize and mitigate the potential negative effects of such space debris. All spacefaring nations should have the obligation to orbital debris mitigation and active debris removal according to their own launch activities and market share, and seek a balance in developing the small satellite industry healthily while not damaging the space environment. It is mentioned in the paper such as the critical analysis to activities and plans in operation with respect to the registration and surveillance procedure to reduce source-identifiable pieces of debris; the feasibility analysis of building accountability mechanism covering issues relating to source-unidentifiable pieces of debris which at the risk of causing damages to either other in-orbit spacecraft or the sustainability of long-term space uses.

This paper also illustrates strategies of China, being an emerging small satellite manufacturer and cluster launch provider to the international market, to fulfill the obligations of liabilities through RD programs involved in space debris removal and mitigation. All the issues above are worth considering for the inevitability of increasing prosperity in small satellite industry.