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Impact-Induced Mission Effects and Risk Assessments (3)

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IMPACT FRAGMENTS FROM HONEYCOMB SANDWICH PANELS

**Abstract**

Sandwich panels are currently employed in space structure thanks to their light weight, high stiffness and mechanical resistance. In case of impacts, the behaviour of sandwich panels is different from simple plates, in terms of damage, number and shape of generated fragments. The consequences of this different behaviour on satellites break-ups is worth of investigation, as available fragmentation data at component level are mostly based on impact tests on plates.

This paper describes the results of a set of impact experiments performed at the University of Padova on honeycomb sandwich panels with aluminium and carbon-fibre reinforced panels (CFRPs) skins. For all tests the generated fragments were collected, weighed, and sifted in size classes; their shape and size were acquired through image acquisition. Test results are presented in terms of fragments characteristic length distributions and shape fragments distributions. It is shown that at the same impact conditions the number of fragments generated by panels with CFRP skins is larger than the ones generated by panels with aluminium skin. With respect to the shape, it was noted that a large fraction of the fragments generated by panels with CFRP skins showed needle-like shapes, with a minor contribution from the panel core; for panels with aluminium skins, the shape distribution can be compared to the one of aluminium simple plates.