



Код: 10831

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Health Monitoring of a Weight Efficient Lattice Spacecraft Structural Element with FBGS Sensors

Дрезден, Германия, 2012 год

7 стр; формат: 23,5 x 16 см; библиографический список: 11 единиц

A weight efficient lattice cylinder of high modulus carbon fiber has been manufactured by EADS CASA Espacio using a new cost efficient fiber placement layering technology and curing process. The open iso-grid structure is formed of composite lattice bars of unidirectional fiber direction where the half of these bars have been instrumented with fibre Bragg grating sensors, FBGSs. These sensors measured the structural strain and the integrity of the structure during static tests conducted until rupture.

The sensitivity to detect the fracture of the bars "far" from the FBGSs have been evaluated during the tests of the structure and with a dedicated test campaign of smaller iso-grid elements. The results showed that damages in the same lattice bar and adjacent bars but several grids far from the sensors could be detected. Structural FE models were prepared and used to compare the test results with the corresponding load cases and with the damage detection sensitivity.

Доклад. 6-я Европейская конференция по мониторингу технического состояния сооружений, 2012. Редакция Кристиана Боллера.

Ключевые слова:

Содержание

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Specimen
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Mechanical tests on the lattice structures sectors
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