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Experimental implementation of shock waves propagation within multi-materials stacks – Application to bonded assemblies' evaluation by laser adhesion test SIMON BARDY, EMILIEN LESCOUTE, LAURENT VIDEAU, CEA,DAM,DIF, BERTRAND AUBERT, DAVID HEBERT, CEA,DAM,CESTA, LAURENT BERTHE, SONDES METOUI, CNRS-ENSAM, TOMAS BERGARA, RESCOLL, MATHIEU DUCOUSSO, SAFRAN, ROMAIN ECAULT, AIRBUS, DIDIER ZAGOURI, SIMCHOC — The Laser Adhesion Test (LASAT) process is based on propagating calibrated shock waves generated by laser within a multi-material stack to evaluate interface mechanical strength. In this work we present results from laser shocks experiments led recently on various multi-material stacks. Experiments were realized on two different laser-shock facilities in order to study the response of above-mentioned assemblies under 7-40 ns pulses in direct irradiation and water-confined irradiation. Free-Surface Velocity (FSV) monitoring was achieved with Velocity Interferometer System for Any Reflector (VISAR) or Photonic Doppler Velocimetry (PDV) system. Various post-shocks diagnostics such as ultrasonic testing, tomography and micrographs were also employed to give complementary information on debonding or substrates fracturation. The aim of this work is to propose an interpretation of the resulting FSV curves in terms of shock waves propagation, transmission, reflection and eventual fracturing of substrates or epoxy layer. Further discussion should then describe the results of LASAT characterization of these samples, emphasizing the correlation between debonding thresholds and bonding quality.

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