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Tensile strength of aluminum-epoxy resin composite structure under high strain rate conditions DAMIEN LAPORTE, FREDERIC MALAISE, CEA CESTA, MICHEL BOUSTIE, CNRS, ERIC BUZAUD, CEA CEG, JEAN-MARC CHEVALIER, CEA CESTA, CEA CESTA TEAM, CNRS TEAM, CEA CEG TEAM — Plate impact and isentropic compression experiments have been conducted to study the shock response of aluminum 6061 T6/epoxy resin composite structure below 1 GPa. Damage of epoxy resin and debonding conditions have been examined by using numerical computations. The dynamic behavior of thermoset polymer is described by a non linear viscoelastic model and a progressive damage model. The failure of aluminum/epoxy resin interfaces is represented by a stress cut-off criterion. The experimental configurations have been designed so that tensile stresses are successively applied into the epoxy resin and at aluminum/epoxy resin interfaces. The computations showed mixed cohesive and adhesive failure of the composite structure. The tensile strength of the epoxy resin depended on the stress pulse duration: 290 MPa for plate impact experiments and 370 MPa for isentropic compression tests. Failure has been clearly identified on the velocity profiles measured at free surface of the aluminium back plate. These results have major interest in the way to develop adhesion tests.

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