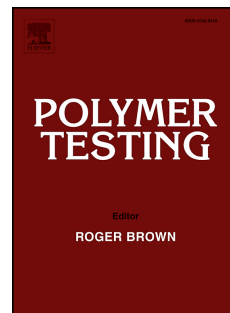


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Design and evaluation of a novel instrumented drop-weight test rig for low-velocity impact testing of fiber-reinforced polymer composite

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Abstract

A low-velocity impact, drop-weight test rig (DWR) intended to test the true impact response of composite material is presented. The test setup was designed to prevent the transfer of unwanted mechanical noise such as vibrations into the load cell that is used to measure the load during the impact event. A novel catch mechanism preventing secondary impact was also implemented in the DWR design. A detailed evaluation was performed both in terms of the experimental modal and uncertainty analysis of the measured results from the DWR. The results demonstrate that the rig is capable of capturing the true impact response, providing highly resolved and noise-free force-time measurements where subtle details of the impact event are visible. The rig is also able to perform impact testing with good repeatability.

Keywords

Vibration, uncertainty analysis, modal analysis, free-fall

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