

Acoustic Emission during Loading of Carbon-fiber Reinforced and Glass-fiber Reinforced Plastics

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The failure processes in fiber-reinforced materials can be arranged in order of ascending energies as polymer matrix crazing, interfacial delamination and fiber fracture. In glass fiber-reinforced plastics, delamination plays a significant part in the failure process. In carbon fiber-reinforced plastics, failure normally occurs by catastrophic fiber fracture with very little acoustic activity before the event. When two polymer composites are combined within a single matrix to produce a fiber composites hybrid material, it is expected that a mixture of failure modes will occur, although this will be dependent on stress and strain levels. Acoustic emissions are the sounds generated by materials under stress: in practice; the amplitude of the acoustic emission signal is most commonly used as a measure of energy. Thus if a histogram of the number of acoustic events within a specific range of energies is formed, then a characteristic series of 'signatures' can be expected for each type of composite. The results of amplitude distribution acoustic emission tests are reported in our experiments for unidirectional carbon fiber with glass hybrid reinforced polymer plastics, tested to failure in bending