ABSTRACT

[**KEY WORDS** : Carbon Fibre, Glass fibre, Epoxy, Composites, Fibre-reinforced polymer, Thermosetting resin, Loading rate, Fibre/Matrix interface, Delamination, Hygrothermal effects, Environmental effects, Absorption, Advanced composite materials, Diffusion, Mechanical properties, Humid condition, Moisture absorption, Moisture content.]

Fibre reinforced polymer (FRP) composite materials have novel properties that offer new engineering opportunities. The present work has been carried out on FRP composites to evaluate the effects of different environmental factors, like, hygrothermal exposure (water vapour), hydrothermal conditioning (liquid water), thermal spikes (short time excursion to high temperature), freezing (sub-zero temperature), acidic and saline water on the mechanical behaviour (especially shear properties).

The present investigation is essentially an experimental one involving glass- and carbon fibre-composites. The resin used is the epoxy system. One important area of the investigation concerns with the absorption of moisture in these composites.

The major emphasis is laid on evaluating the interlaminar shear strength (ILSS) of laminated composites, which is the weakest structural link and forms an important

design criterion. The ILSS values are found to be highly sensitive to deterioration due to such absorbed moisture. The strain rate effect on the hygrothermally conditioned ILSS specimens has also been carried out.

The present work has also been focussed in the area of effects of freezing and thermal spike on the hygrothermally conditioned glass/epoxy composites to investigate the deleterious effect on ILSS values.

An investigation has also been carried out with glass/epoxy composites to find out the behaviour of ILSS values by immersing the materials in H_2SO_4 and NaCl solution of water.