Modelling of multi-axial ultimate elastic wall stress (UEWS) test for glass fibre reinforced epoxy (GRE) composite pipes

Abstract

This paper describes the modeling of multiaxial ultimate elastic wall stress (UEWS) at room temperature for glass fibre reinforced epoxy (GRE) composite pipes. The model developed, predicts the stress-strain response caused by the combined, static and cyclic of UEWS loading taking into effects of transverse matrix cracking within the laminates. The procedure, although not a standard method, seems to provide a good alternative to the current raw materials' re-qualification procedure delineated in ISO 14692 through ASTM D2992. The effective transverse and shear modulus of the lamina due to increasing presence of transverse matrix cracking were estimated. Classical laminate analysis was then applied to compute the corresponding ply properties as a function of increasing stress and strain. The model shows a good agreement with the experimental results of multiaxial UEWS tests on ±55° filament wound glass-reinforced epoxy pipes.