

**THE USE OF X-RAY DIFFRACTION MEASUREMENTS TO DETERMINE  
THE EFFECT OF AGING ON RESIDUAL STRESSES IN UNIDIRECTIONAL  
AND WOVEN GRAPHITE/POLYIMIDE COMPOSITES**

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The purpose of this study was to evaluate the effect of aging in air on the residual strains and stresses in unidirectional and woven graphite/polyimide composites. In order to calculate these strains and stresses, X-ray diffraction (XRD) measurements have been made on embedded Al particles placed between the first and second plies of both unidirectional and graphite fabric /PMR-15 composite specimens subjected to aging in air at 315°C for up to 1024 hours. It was shown in this work that the thermal residual strains and stresses in the inclusions determined by XRD were decreasing as a function of the aging time. The numerous factors that will be discussed in this paper caused these changes. In the modeling part of this research, the interlaminar and intralaminar stresses in the unidirectional and woven composites were calculated using visco-elastic laminated plate theories and the Eshelby method, and subsequently compared with the experimentally obtained results.