

# CONDITION ASSESSMENT OF KEVLAR COMPOSITE MATERIALS USING RAMAN SPECTROSCOPY

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## ABSTRACT

This thesis presents the results of an investigation of the Raman scattering effects of aging Kevlar composite strands. The goal of this research is to investigate the potential application of Raman spectroscopy as a nondestructive evaluation tool for the detection of aging effects of in-service composite materials. Kevlar composites used as over-wrapping of metal-lined composite over-wrapped pressure vessels (COPVs) have been analyzed. Raman spectra produced from the Kevlar fibers and the effects of resin materials, utilized to bind the fibers into strands to provide composite behavior, have been investigated. A series of Kevlar / epoxy strands exposed to elevated temperatures and sustained loading have been evaluated. It was found that this exposure had an effect on the width and intensity of certain bands in the Raman spectra of Kevlar. The potential application of these findings to the nondestructive evaluation of Kevlar composites is discussed.