

Composite materials

A variety of composite material has been studied by acoustic microscopy. For example, it can be used to image the damage of successive interfaces between the different plies of a laminated composite that has experienced impact damage. Between the plies nearest the surface the damage is slight, but between plies at a greater depth the damage becomes greater, and the delaminated areas take on different orientations depending on the ply orientations.

This makes acoustic microscopy particularly powerful for this kind of high-resolution, non-destructive inspection for subsurface damage in composites in critical applications.

In all the specimens the contrast was dominated by strong excitation of Rayleigh waves in the surface. This gave strong contrast from different phases, and revealed interfaces and cracks by characteristic crack patterns. Quantitative agreement between observed and calculated fringe patterns was found, and values of shear and Young's modulus were measured. In the SiC monofilament specimens, various stages of progressive deterioration as a result of thermal ageing treatments were observed.