

Enhancement of product durability and usability for resource-efficient society

Operando micro-measurement analysis method for CFRP composite degradation and a model for remaining life estimation

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Summary :

CFRP composites have the advantage of lightest weight and highest rigidity compared to other structural materials, but the degradation mechanism at the molecular level has not yet been clarified. In this study, the operand-micro analysis of the degradation mechanism of CFRP composites and the in-situ measurement method of the degradation state (e.g., fatigue progression) are developed for use in aircraft and automobiles.

For the elucidation of the degradation mechanism, we are developing an operando analysis method, utilizing electron spin resonance (ESR) to study degradation phenomena at the molecular level. A model for estimating the remaining life span based on nanoscale science will be constructed. The development of an unprecedentedly compact ESR operand measurement and analysis system is aimed at monitoring and analyzing the degradation state at various locations in actual aircraft and automobiles.

