MONITORING DAMAGE ACCUMULATION USING ACOUSTIC EMISSION AND ELECTRICAL RESISTANCE AT ROOM AND ELEVATED TEMPERATURES OF SiC-BASED COMPOSITES

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Damage development in SiC-based composites, due to the formation of various sources such as in-plane or out of plane micro-cracking and/or fiber breakage, accounts for the non-linear stress-strain properties in these classes of materials. In addition, the onset of early damage is often the precursor to composite degradation and long-time failure for various stress-time-temperature-environment conditions. Acoustic emission (AE) and electrical resistance (ER) are two techniques that are very good at monitoring the onset and development of damage in these types of composites. The use of AE and ER will be highlighted for a number of composite systems and mechanical damage scenarios. They have proven very enlightening in a lab setting and ER in particular offers some potential for the monitoring of applications. Some of the research presented will include testing of standard tensile bars as well as single-notch test specimens of SiC-based composites at room and elevated temperature. The effects of different constituent contents such as Si and/or C will also be demonstrated.