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Probabilistic Simulation for Combined Cycle Fatigue in Composites

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 24 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. A methodology to compute probabilistic fatigue life of polymer matrix laminated composites has been developed and demonstrated. Matrix degradation effects caused by long term environmental exposure and mechanical thermal cyclic loads are accounted for in the simulation process. A unified time-temperature-stress dependent multifactor interaction relationship developed at NASA Glenn Research Center has been used to model the degradation of material properties due to cyclic loads. The fast probability integration method is used to compute probabilistic distribution of response. Sensitivities of fatigue life reliability to uncertainties in the primitive random variables (e. g. , constituent properties, fiber volume ratio, void volume ratio, ply thickness, etc.) computed and their significance in the reliability-based design for maximum life is discussed. The effect of variation in the thermal cyclic loads on the fatigue reliability for a (0- 4590)s graphite epoxy laminate with a ply thickness of 0. 127 mm, with respect to impending failure modes has been studied. The results show that, at low mechanical cyclic loads and low thermal cyclic amplitudes, fatigue life for 0. 999 reliability is most sensitive to matrix compressive strength, matrix...



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