

Fatigue Characterization of High Performance Hybrid Aluminium AA 5083/SiCp/Fly Ash Metal Matrix Composites

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ABSTRACT

Fatigue of the components is a critical aspect that needs to be addressed for effectively using the Aluminium Metal Matrix Composites in a variety of applications, especially the aircraft components, since the damage that occurs due to fatigue is progressive and may lead to overall failure of the structure of the aircraft. Henceforth in the present work, the fatigue behavior of Aluminium AA 5083 Matrix reinforced with varying weight percentage of silicon carbide viz., 3, 5, 7 and 9 and varying weight percentage of fly ash viz., 2, 3, 4 and 5 and fabricated enroute the process of stir casting at four different parameters viz., the stirring speed of 50, 100, 150 and 200 rpm, and the stirring duration of 15, 20, 25 and 30 min are evaluated. The main purpose of fatigue characterization accomplished in accordance with ASTM F1160 standards on a typical RR Moore rotating beam fatigue testing machine is to distinctly evaluate the life cycle of components that are fabricated from metal matrix composites and eventually develop a framework model for the significant study of fatigue strength of the structure with persistent striations all along the interstitial of aluminium-silicon carbide-fly ash interfaces. Fatigue is a stochastic process rather than a deterministic one, thus in the present work, Analysis of Variance (ANOVA) is carried out to establish the authenticity of the results and validate them. The results and plots are presented with suitable rationale and inferences considering the stress range, stress amplitude and number of cycles to failure.

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