Graduate Student Research Seminar

Spring 2026

Creep-Fatigue Interactions in Ti-5Al-5Mo-5V-3Cr

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Monday, March 2nd
3:00 pm (EST) – 132 Fluor Daniel Building

Abstract

The α/ß phase dynamics in metastable ß-Ti have the potential to resist the known deleterious creep-fatigue interactions in Ti alloys. Ti-5Al-5Mo-5V-3Cr was tested at matching stress levels across creep, fatigue, and thermomechanical fatigue with dwells to isolate creep-fatigue interaction damage. Deformation was captured by *in-situ* digital image correlation which was used to facilitate comparisons of strain rates, plastic deformation accumulation, creep life, and cyclic life. Life quantification was done using the MPC Omega model for creep. Significant reductions in lifespan were found when the testing temperature was increased from 300 to 400°C; these temperatures are typically considered within and above allowable usage temperatures for titanium alloys. Temperature dependent ductility exhaustion drove macroscale behavior, and time-at-temperature dominated the phase dynamics. Limited life enhancement was found in creep-fatigue, likely due to recovery effects from α-Ti stability at the testing temperatures.

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