TOWARDS HIGH THROUGHPUT FATIGUE CHARACTERIZATION

Grant West* and Derek Warner

Cornell Fracture Group, School of Civil and Environmental Engineering, Cornell University, Ithaca NY, USA
** Presenting Author email: grw66@cornell.edu*

Abstract

While the advance of experimental and computer modeling techniques has continued to push mechanistic understanding and predictive modeling capabilities forward, the capability to generate fatigue data has been almost stagnant. Fatigue engineering and research efforts often operate in a data starved modality (considering the highly stochastic nature of fatigue failures). This impedes attempts to effectively use modern machine and statistical learning tools for fatigue performance prediction, both within standard prognosis frameworks, and integrated computational materials engineering (ICME) frameworks.

This presentation will report on our exploration for opportunities to improve the throughput of fatigue testing machines utilizing the expanded design space offered by technological advancement, e.g., computer aided drawing and manufacturing, data acquisition and computer modeling, and robotic automation. Following our review, we will present two concepts for uniaxial high throughput fatigue testing, with the goal of improving fatigue throughput by ~100x while conforming to popular test standards. Our progress towards this goal, and ultimately the prospects for achieving it, will be presented by sharing the results of multiple design-build-test iterations.