MECHANICAL ENGINEERING STUDENT SEMINAR

Wednesday, August 3 2022 at 13:30, D. Dan and Betty Kahn Building, Auditorium 1.
Online: https://technion.zoom.us/j/95417951589

The Effect of Stacking Sequence and Ply Orientation on Damage Evolution in Statically Loaded UD Carbon Epoxy Laminates

Tzach Nachmann

Adviser: Prof. Daniel rittel

Co-Adviser: Doctor Ofir Shor

The use of composite materials in the aerospace industry has been growing extensively due to their excellent strength properties, low specific weight, and fatigue resistance. Yet their failure mechanisms is one of the most complex in the material world and makes it difficult for engineers to design composite structures, hence the importance of understanding the crack propagation in different architectures.An experimental study was carried out to investigate the effect of material architecture on the damage evolution and comparing different methods for finding the relationship between the fracture resistance and the crack propagation (the crack resistance curve, R-Curve) in carbon/epoxy composite laminates through Overheight Compact Tension (OCT) tests.Three representative lay-up configurations were designed for unidirectional (UD) laminates: a hard (cross-ply), a soft (±45°) as well as a dispersed quasi-isotropic (QI) laminate. The tests were carried out using various measurement techniques such as Digital Image Correlation (DIC) and Acoustic Emission (AE). Interrupted tests were carried out at distinct phases of loading to determine and highlight the damage state of the specimens using X-Ray Computed Tomography. UD architectures exhibit extensive subcritical damage prior fiber fracture in the form of transverse microcracking and delamination throughout the laminates. Additionally, three method to determine R-Curves were applied and compered by extracting the compliance using the experimental POD curves that were obtained in these experiments.

Seminars Coordinator: Assoc. Prof. Matthew Suss.

Note: the seminar will be given in Hebrew

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