



MECHANICAL ENGINEERING STUDENT SEMINAR

Wednesday, November 27 2024 at 13:30

Online: <https://technion.zoom.us/j/93794989484>

A thermomechanical study of the mode II impact response of fatigue cracks and sharp notches

Tamir Albik

Advisers: Prof. Daniel Rittel and Dr. Gil Goviazin

This seminar presents a detailed thermomechanical comparison between fatigue pre-cracked and sharp-notched Ti-6Al-4V specimens under dynamic mode II loading. Using a single-point impact experiment, the response of these specimens was investigated through synchronized high-speed thermal and visual imaging. Frictional heating was isolated by comparing the thermal energy in fatigue pre-cracked specimens, which exhibited crack flank friction, to that of notched specimens with negligible friction.

In the fatigue pre-cracked specimens, non-uniform temperature distributions formed, with distinctive localized "hot spots" along the crack flanks, suggesting significant frictional heating. These thermal patterns bear a strong resemblance to those previously reported in shear bands, though they arise from different physical mechanisms. Friction was found to account for over 75% of the thermal energy in the fatigue pre-cracked specimens, while plastic deformation was identified as the primary heat source in the notched specimens. Additionally, temperatures in the fatigue specimens reached up to three times higher than those in the notched specimens. These findings highlight the critical role of friction in thermal dissipation during mode II loading.

Note: the seminar will be given in Hebrew