THE UNIVERSITY OF ARIZONA
College of Engineering

Aerospace and Mechanical Engineering Seminar

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Internal stress control for correcting shape errors in mirror surfaces

Abstract: Accurately-shaped thin mirrors could enable future space telescopes with far larger apertures than are possible today, by allowing large mirror area to be packaged into a launch vehicle. One promising method of shaping thin mirrors is to apply stress at or near the surfaces of the mirror substrate to induce controlled bending. In this talk I will show that to induce a general 2D deformation field, without adding additional surface height errors, requires controlling both principal plane stress components (and their orientation). Most attempts at stress-based shape correction have focused on applying equibiaxial stress only, which limits the types of deformations that can be accurately generated. While there are many possible methods of applying and controlling non-equibiaxial plane stress, this talk will focus on my work using high-energy ions implanted in glass to generate internal stress, using the ion dose and ion angles of incidence to control the magnitudes and direction of the principal stresses. I will then discuss how this work has informed my current and future research in this area, including other important areas where precise internal or surface stress control may be valuable.

Bio: Brandon Chalifoux is an Assistant Professor in the Wyant College of Optical Sciences at the University of Arizona. He received his PhD in Mechanical Engineering from MIT in 2019, and he was a postdoctoral associate in the Space Nanotechnology Laboratory at the MIT Kavli Institute for Astrophysics and Space Research, until moving to Arizona in the middle of summer. Prior to graduate school, he worked on concentrated solar energy generation as an engineer at a small Vermont startup, Solaflect Energy.

Thursday, December 3rd, 2020 at 4:00 P.M.

Zoom Link: Email eperumala@arizona.edu