Public Abstract

First Name:Marius

Middle Name:Daniel

Last Name:Ellingsen

Adviser's First Name:Sanjeev

Adviser's Last Name:Khanna

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SS 2009

Department:Mechanical & Aerospace Engineering

Degree:PhD

Title:Investigation of Static Interfacial Fracture in Orthotropic-Orthotropic Composite Bimaterials Using Photoelasticity

The effects of static Mode I (opening mode) and mixed-mode (both Mode I - opening mode and Mode II - shear mode present) loading on orthotropic-orthotropic bimaterial interface cracks and isotropic-orthotropic bimaterial interface cracks has been investigated using the experimental technique of transmission photoelasticity. For successful implementation of this experimental technique a transparent and birefringent glass fiber reinforced polyester composite material was developed, enabling the direct observation and recording of photoelastic fringes in the vicinity of the interface crack in the orthotropic bimaterial. Mode I and Mode II stress intensity factors were calculated, as were the strain energy release rates, for various combinations of bimaterial halves, interface properties, and interface orientations. The experimentally obtained fringe patterns were mathematically regenerated for validating the fracture model.