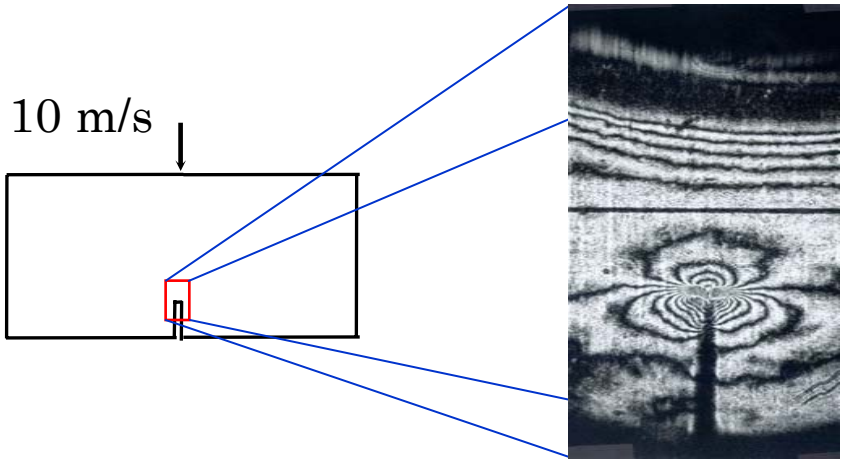
Ares Rosakis

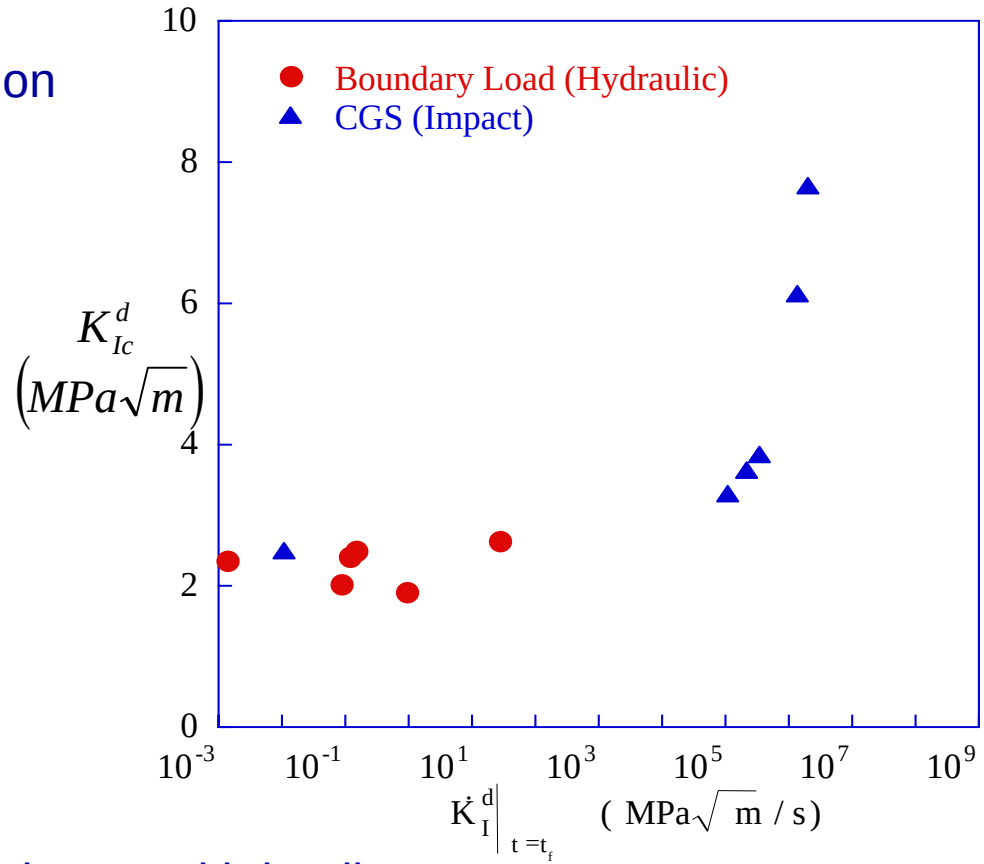
Crack Initiation Criteria in Composites

Objectives:

➡ Establish Mode I dynamic crack initiation criteria for unidirectional composites.



CGS Interferogram



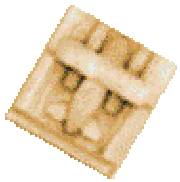
Significant Finding:

➡ Dramatic increase in fracture toughness with loading rate.

Payoffs:

➡ Quantify potential improvements in composite design and fabrication.

➡ Improve analyses of failure due to dynamic loading.

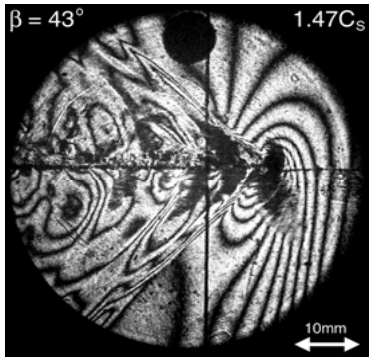


Intersonic Shear Crack Growth in Bonded Structures

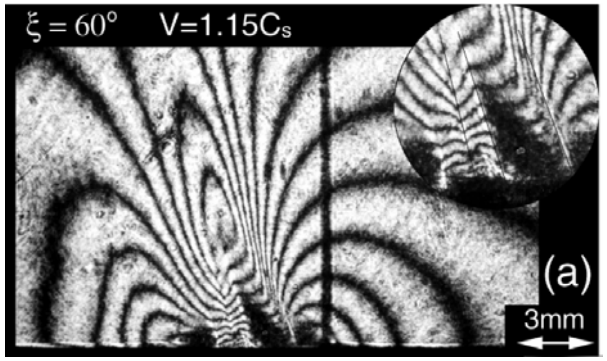
Ares Rosakis

Objectives:

- Study shear-dominated dynamic crack growth, first along a single weak interface in model specimens, then parallel to fiber direction in actual composites. Experimentally visualize stress fields using photoelasticity and high speed photography.



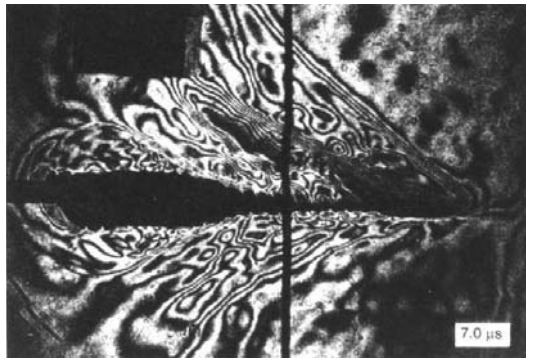
Homalite/homalite



Homalite/steel

Significant Finding:

- Observations of shear-dominated crack growth at speeds between the shear wave and longitudinal wave speeds. (Note the Mach cone-like structures in the interferograms).



Composite

Payoffs:

- Revelation of new failure mechanisms in composites that had neither been observed experimentally nor predicted theoretically.
- Awareness of new class of failure criteria for the safe design of composite structures