









GROWTH OF INTERFACE CRACKS ON CONSECUTIVE FIBERS: ON THE SAME OR ON THE OPPOSITE SIDES?

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Outline

Micromechanical Modeling of Initiation of Transverse Cracks

Conclusions











MICROMECHANICAL MODELING OF INITIATION OF TRANSVERSE CRACKS



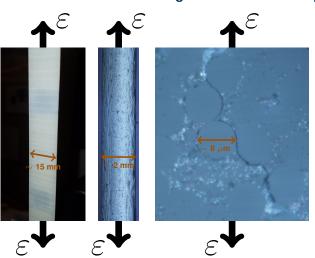








Initiation of Transverse Cracking in FRPCs: Microscopic Observations



Left:

front view of $[0, 90_2]_S$, visual inspection.

Center:

edge view of $[0, 90]_S$, optical microscope.

Right:

edge view of $[0, 90]_S$, optical microscope.





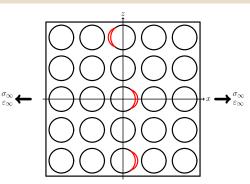






Initiation of Transverse Cracking in FRPCs: Micromechanics

Stage 1: isolated debonds







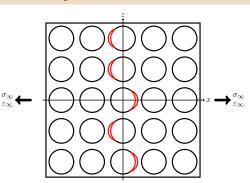






Initiation of Transverse Cracking in FRPCs: Micromechanics

Stage 2: consecutive debonds







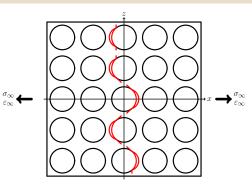






Initiation of Transverse Cracking in FRPCs: Micromechanics

Stage 3: kinking







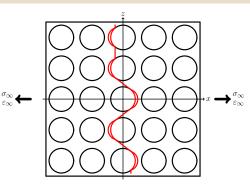






Initiation of Transverse Cracking in FRPCs: Micromechanics

Stage 4: coalescence













Micromechanical Modeling of Initiation of Transverse Cracks Conclusions













Micromechanical Modeling of Initiation of Transverse Cracks Conclusions

Conclusions

 \rightarrow $f_{\text{straight crack}}(\Delta \theta): \sqrt{G_l}, \times G_{ll}$

 $f_{\text{inclined crack}}(\Delta \theta)$: $\sqrt{G_{I}}$, $\sqrt{G_{II}}$, $\times \# f_{\text{inclined crack}}(\Delta \theta = \frac{\pi}{2})$

 $f_{\text{curved crack}}(\Delta \theta)$: $\sqrt{G_I}$, $\sqrt{G_{II}}$

⇒ scaling breaks for $\Delta\theta \leq 20^{\circ}$ → microstructure is important for small debonds!

