LIQUID COMPOSITE MOLDING PROCESS

Resin injection into a part with fabric

Resin flow simulations in a mold require knowledge of fabric permeability in all principal directions

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OBJECTIVE

- Develop an algorithm to determine the 3D permeability tensor of fibrous media from a single radial flow experiment.

\[ \mathbf{u} = \left( \frac{\mathbf{K}}{\mu} \right) \nabla P \]

Darcy's Law

\[ \mathbf{K} = \begin{bmatrix} K_{xx} & K_{xy} & K_{xz} \\ K_{yx} & K_{yy} & K_{yz} \\ K_{zx} & K_{zy} & K_{zz} \end{bmatrix} \]

Fabric Permeability Tensor

EXPERIMENTAL SET-UP DESCRIPTION

- Flow front information is acquired by electronic sensors that trigger when they come into contact with the fluid.
- Sensors are connected to a data acquisition system to acquire experimental flow front arrival times at the sensors.
- Two plates: top and bottom sensor plate with 96 electronic sensors embedded in each plate in a radial fashion, sandwich the fibrous media.

RESULTS

Woven E-glass fibrous media @ 45% v/f

- Experimental work with woven E-glass fibrous media to validate the approach.
- The effect of distribution media on the permeability of fibrous media needs to be investigated.

FUTURE WORK

- Experimental work with woven E-glass fibrous media to validate the approach.
- The effect of distribution media on the permeability of fibrous media needs to be investigated.

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