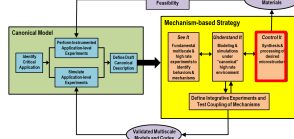


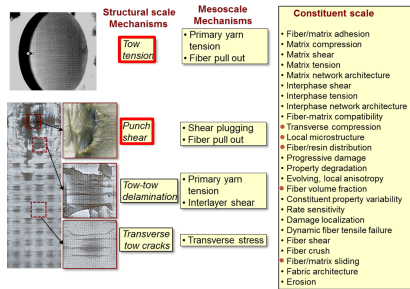
Suresh G. Advani, Shridhar Yarlagadda, Michael Yeager

How We Fit

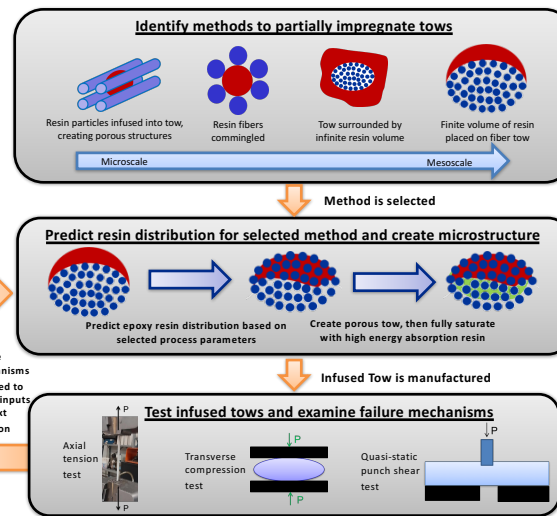
Materials-by-Design Process



Mechanism-based Approach

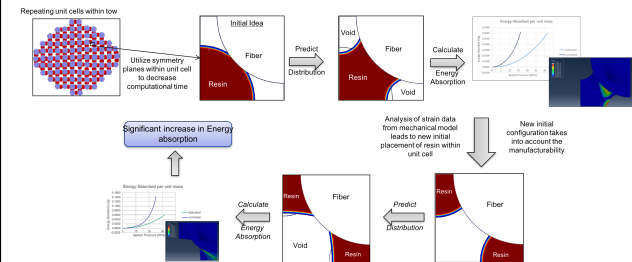


Technical Approach



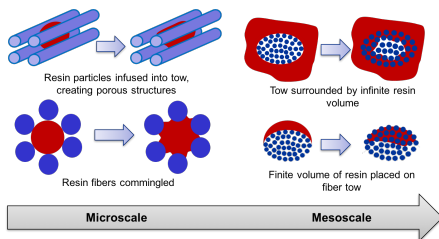
Key Accomplishments

- We developed a relationship between processing parameters and energy absorption through collaboration with Ganesh and Gillespie (Micromechanical FE Modeling of Tensile Failure of Unidirectional Composites)

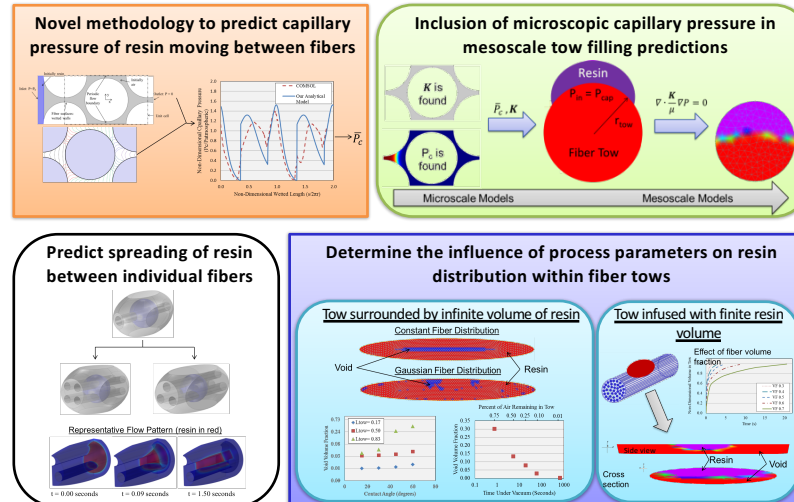


Key Goals

- To predict the influence of process parameters on resin distribution within a fiber tow on the micro and meso scale as shown below
- This will result in a porous structure that can then be infused with a different type of resin
- To identify the relationship between resin distribution and energy absorption and determine the optimal resin distribution

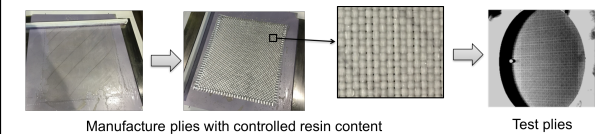


Major Results



Future Directions in 2017

- Make single ply composites with controlled resin distribution
 - Test partially infused, partially porous plies
 - Test hybrid resin plies (part epoxy, part polyurethane)
- Plies will be shot with projectiles to determine the V50 and develop a relationship between V50 and areal density



Impact

- Developed a methodology to predict resin distribution within tows to optimize resin distribution between the fibers
- Controlling resin distribution within a tow will allow for the creation of hybrid resin composites, with one resin providing stiffness and a second resin to enhance energy absorbing capabilities
- This will result in composites with the capacity to absorb more energy in extreme dynamic environments

