

Research Title: Process Modeling for Polymer Matrix Composites**Individual Sponsor:**

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Academic Area/Field and Education Level

- Ph.D. or Ph.D. candidate Mechanical or Composites Engineering Discipline

Objectives:

- 1) Develop a flow model for low melt viscosity, high temperature polymer resins.
- 2) Define, measure and integrate key resin properties (viscosity, pot life etc.) and 3D preform permeability that will be used to develop a flow model.
- 3) Validate flow model with actual resin injection experiments in a flat panel mold or a more complex part geometry.

Description:

Resin Transfer Molding (RTM) of high performance composites provides a number of advantages such as decreased cost, cycle time and the potential to utilize 3D fiber preforms over traditional hand-layup, autoclave-based, part fabrication. The goal of this research topic is to develop a model using commercial RTM modeling packages that reflects the permeability of state-of-the art high temperature polymer resins with fiber preforms. The research will require the acquisition of key resin properties and engineering parameters suitable to provide a model that can be validated with actual flat panel or more complex mold geometries. Integration of models that predict defect formation during resin infusion processing into commercial or custom flow/cure/thermomechanical modeling software will be requisite for developing predictive tools of value to the Air Force.

Research Classification/Restrictions:

US Citizens only. The resins that will be used in the program are considered at the least, commerce controlled.

Eligible Research Institutions:

Any