Oral Qualifying Exam - Composites

This exam covers various aspects of the design, processing, mechanical properties and performance of advanced composite materials with a focus on polymer matrices.

POTENTIAL TOPICS THAT WILL BE COVERED

- Processing and properties of common fibers (e.g. carbon, glass, Kevlar, SiC)
- Fiber/matrix interface (surface treatments, interfacial adhesion)
- Anisotropic elasticity (generalized Hooke's Law, material symmetry, orthotropic stress-strain relations)
- Micromechanics for property predictions (rule of mixtures, Halpin-Tsai equations, self-consistent field models, shear lag theory)
- Classical lamination theory (laminate properties, laminate failure)
- Thermal Stresses
- Processing science (reaction kinetics, voids, flow, heat transfer)
- Manufacturing techniques (hot press, autoclave, filament winding, liquid molding)

LEVEL (BASED ON UIUC COURSES)

TAM 428 (MSE 456/AE 428), AE 526 (TAM 526/ME 555)

SUGGESTED TEXTS

- I.M. Daniel and O. Ishai, *Engineering Mechanics of Composite Materials*, 1994.
- Agarwal, B. and L. Broutman, *Analysis and Performance of Fiber Composites*, 1990.
- Hull, D. and T.W. Clyde, *An Introduction to Composite Materials*, 1996
- Gutowski, T., *Advanced Composites Manufacturing*, 1997