



PhD position: Multi-Scale Fatigue Modelling of Out-of-Autoclave Composite Materials

Department: Materials Engineering, UBC

Start date: immediate

Project description:

Fiber reinforced polymer (FRPs) composite materials are increasingly used in load-carrying structures owing to their high stiffness and strength and low weight advantages. Applications for these types of materials include the aerospace, automotive, marine and energy industries among others. Many of these structures are subjected to cyclic loading. Due to their inherent anisotropic nature, the fatigue behavior of FRPs is not well understood.

The current research focuses on Out-of-Autoclave (OOA) processing of FRPs as a low-cost manufacturing approach compared to the traditional high-pressure autoclave curing which necessitates high capital investments and increased energy requirements. OOA structures are cured at lower pressures and temperatures compared to their autoclave counterparts. Nevertheless, OOA processing results in more challenging part quality control and especially uncertainties in part thickness, resulting reinforcement architecture, and voids.

The scope of the current PhD proposal will focus on developing an understanding of the uncertainties in the micro-structure of OOA FRPs and development of a multi-scale multi-physics stochastic FE based model for the prediction of the fatigue life and damage behavior of these structures.

Qualifications:

- The successful applicant will have an MSc (or equivalent) degree in Applied Mechanics, Mechanical Engineering, Materials Engineering, Structural Engineering or similar with an emphasis on computational methods.
- Proven strong knowledge of programming languages (preferably python) is required.
- Previous experience in Finite Element Modelling is a strong asset.

Application:

Interested candidates are invited to send their C.V. directly to Dr. Abdin.

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