Title: Fatigue Life Assessment of Bonded Structures

Type of award PhD Research Studentship

Department Aerospace Engineering, Bristol Composites Institute

Scholarship Details Minimum £21,668 p.a.

Duration 3 years

Eligibility Home (UK)

Start Date Available now

PhD Topic Background/Description

Light-weight advanced composites are widely used in the aerospace industry to reduce CO₂ emissions. Fatigue of composite structures is an important research topic and a key area for aircraft certification. Adhesively bonded joints offer lower weight, a more uniform stress distribution and enhanced fatigue life when compared to the traditional mechanical fastening methods. However, they have not been widely applied to aircraft primary structures due to reliability issues compared to mechanical fastening.

Fatigue experiments are time-consuming and expensive. The acceleration of aircraft development cycles creates the need for replacing physical fatigue testing with robust numerical modelling. This is because numerical modelling can help reduce costs associated with fatigue testing and shorten the design cycle.

So far, most existing fatigue tests and models for bonded composite structures have been for room temperature dry conditions. Little research has been done at hot wet conditions which is key for aircraft certification. The aim of this PhD project is to develop numerical models and structural design criteria for bonded structures considering fatigue loading with initial defects under severe environmental conditions.

The student will be able to study in the prestigious Bristol Composites Institute at the University of Bristol, and work with a world-leading aerospace company. This is an excellent opportunity to tackle an important research question and advance the knowledge of fatigue performance of bonded structures which will underpin the design and certification of future aircraft.

Candidate Requirements

Applicants must hold/achieve a minimum of a master’s degree (or international equivalent) in a science, mathematics, or engineering discipline. Applicants without a master’s qualification may be considered on an exceptional basis, provided they hold a first-class undergraduate degree. Please note, acceptance will also depend on evidence of readiness to pursue a research degree.

If English is not your first language, you need to meet this profile level:
Profile E

Further information about English language requirements and profile levels.
It is expected that the students will have good experimental and numerical skills with a background in one or more of the following:

1. Mechanical testing
2. Composites manufacturing
3. Finite element analysis using Abaqus, LS-DYNA or similar
4. Computer programming using Matlab, Python or similar
5. Composite mechanics

Desirable skills also include:
1. Working experience in industry
2. Fatigue testing

Scholarship Details
Stipend at the UKRI minimum stipend level (£17,668 p.a.) plus an industrial top-up of £4,000 p.a. will also cover tuition fees at the UK student rate. International students are welcome to apply who can cover the fee difference. Funding is subject to eligibility status and confirmation of award.

Informal enquiries
For questions about the research topic, please contact Professor Michael Wisnom and Dr Xiaodong Xu.
For questions about eligibility and the application process please contact CAME Postgraduate Research Admissions came-pgr-admissions@bristol.ac.uk.

Application Details
To apply for this studentship, submit a PhD application using our online application system.

Please note for non-standard start dates select the closest start date and apply as normal. Once the application is complete, please contact came-pgr-admissions@bristol.ac.uk to amend the start date.

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Aerospace Engineering Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor.

Closing date for application: 5 Feb 2023