



Title: Probabilistic Fracture Mechanics for Structural Integrity Assessment

Type of award PhD Research Studentship

Department Mechanical Engineering

Scholarship Details Scholarship covers full UK/EU (EU applicants who have been resident in the UK for 3 years prior to 1st September 2018) PhD tuition fees and a generous tax-free annual stipend (at least £16,000, subject to contracts).

Duration 4 years

Eligibility Home/EU/Overseas applicants

Starting Date 1 October 2018

PhD Topic Background/Description

Fracture mechanics calculations are used to assess the acceptability of flaws in safety-critical welded structures. Engineers use assessments based on fracture mechanics to, for example, justify component life-extension and to inform defect-tolerant design. Most assessments are carried out 'deterministically', i.e. using a single conservative set of inputs designed to ensure a high margin of safety. However, within the nuclear industry and elsewhere there is an increasing requirement for probabilistic assessment. Probabilistic assessment is more data-intensive and computationally demanding, but integrity assessments based on probability-of-failure can provide much more information to the designer, plant operator and regulator. The complex nature of welded joints in metals (imperfect microstructure, presence of residual stresses and defects) makes it difficult to perform accurate probabilistic assessment on them.

In this PhD project, you will explore the issues associated with determining residual stresses in welded joints and incorporating imperfect residual stress information into probabilistic fracture mechanics calculations of real structural components. You will work at the National Structural Integrity Research Centre (NSIRC) near Cambridge and at the University of Bristol, collaborating closely with colleagues from TWI Ltd. Your work will be used to improve fitness-for-service assessment standards such as BS 7910 (the UK's general assessment standard for metallic structures) and R6 (the UK nuclear industry's assessment procedure), ensuring the safe and reliable operation of high-dependability mechanical parts.

Further Particulars

Candidate Requirements

We are looking for an enthusiastic student with a minimum 2:1 honours degree in Engineering or a related discipline.

Some knowledge or experience of stress analysis is essential. Knowledge of statistical analysis and/or fitness-for-service assessment together with scientific coding skills and experience with software development would be an advantage.

Informal enquiries

For informal enquiries please contact Dr Harry Coules harry.coules@bristol.ac.uk

For general enquiries, please email came-pgr@bristol.ac.uk

Application Details

To apply for this studentship submit a PhD application using our [online application system](#)

[www.bristol.ac.uk/pg-howtoapply]

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

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