Title: Fast Simulation of the Automated Fibre Placement (AFP) of Composite Structures

<table>
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<tr>
<th>Type of award</th>
<th>PhD Research Studentship</th>
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<tbody>
<tr>
<td>Department</td>
<td>Aerospace Engineering, Bristol Composites Institute</td>
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<td>Scholarship Details</td>
<td>Minimum £15,609 p.a.</td>
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<td>Duration</td>
<td>3 years</td>
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<td>Eligibility</td>
<td>Home (UK) and EU citizens who have confirmation of UK settlement or pre-settlement status under the EU Settlement Scheme</td>
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<td>Start Date</td>
<td>From September 2022</td>
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PhD Topic Background/Description
An opportunity has arisen at Bristol Composites Institute (BCI) for a PhD in the field of digitalisation of the manufacture of composite materials. The institute has over 150 researchers and works closely with the £60M National Composites Centre, which is a wholly owned subsidiary of the University engaged with industry to fully exploit and develop composites technology. The research project will be carried out in collaboration with the PMM team of the GeM Laboratory at École Centrale de Nantes (EC Nantes) in France. The student will be expected to spend about half of their time at BCI and half of their time at EC Nantes.

In the last 10 years or so, digitalisation has revolutionised the manufacturing sector, allowing more intelligent, efficient, and less wasteful processes. This has been enabled by recent advances in in-situ sensing and data analytics. Hence a combination of high-volume data collection, processing and analysis allows real-time monitoring of the process and on-the-fly adjustment if needed. The composites industry is, however, characterised by its high value and low throughput nature and has so not followed this trend. It is often argued that this lack of physical data could be supplemented by the production of synthetic data produced by physics-based models.

A manufacturing technique that would be particularly well suited for such change in paradigm is Automated Fibre Placement (AFP). Current process models for AFP are however slow (they take longer to run than it takes to actually make a part). The present project proposes to combine BCI expertise in the simulation of the AFP process with EC Nantes expertise in the modelling of fibrous materials using continuum mechanics framework to create a fast and accurate simulation platform for the AFP process. The feasibility of real-time process optimisation combining this new physics-based simulation of the process with data-analytics will be explored. Both institutes also have world class experimental facilities that will be used to validate the models.

Further details of our composites research can be found via www.bris.ac.uk/composites/research and for GeM via https://www.ec-nantes.fr/centrale-nantes/news/meet-our-researchers-christophe-binetruy
**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](#).

**Scholarship Details**
Stipend at the UKRI minimum stipend level will also cover tuition fees at the UK student rate. Funding is subject to eligibility status and confirmation of award.

To be treated as a home student, candidates must meet one of these criteria:
- be a UK national (meeting residency requirements)
- have settled status
- have pre-settled status (meeting residency requirements)
- have indefinite leave to remain or enter.

**Informal enquiries**
For questions about the research topic, please contact Dr Jonathan Belnoue and Professor Stephen Hallett

For questions about eligibility and the application process please contact CAME Postgraduate Research Admissions [came-pgr-admissions@bristol.ac.uk](mailto:came-pgr-admissions@bristol.ac.uk)

**Application Details**
To apply for this studentship, submit a PhD application using our [online application system](http://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 Aerospace Engineering Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor.