

ESR1: Application of Automatic Differentiation for unsteady flows

School of Engineering and Materials Science, Queen Mary, University of London (QMUL)

The hosting group

Queen Mary is a world-leading university ranked among the top 150 in the world. 20,000 students are enrolled in a wide variety of programs, with a strong post-graduate program with an extensive programme in complementary skills. A wide range of facilities is offered, in particular exciting new 1500 core high-performance computing facility.

The School of Engineering and Materials Science has a very strong research programme in a broad range of engineering disciplines with experimental and numerical projects sponsored by industry, UK bodies and the EC.

The work is supervised by Dr. J.-D. Müller, senior lecturer at QMUL who heads the optimisation group. His research focuses on developing novel algorithms for CFD with a particular emphasis on developing adjoint methods for optimal design. He has extensive experience in organising research projects at UK and EU level. He has been partner in EC FP5 and FP6 grants and is currently coordinating the FP7 project FlowHead.

The work

- Familiarisation with shape optimisation, adjoint methods, and automatic differentiation (AD)
- Familiarisation with the existing flow code it's adjoint code developed in the FlowHead project, 1.5 month secondment to ESI (France). Further improvement in scope and functionality of the adjoint code
- Familiarisation with unsteady flows. Implementation of check-pointing strategy, validation, benchmarking, application to small cases, publication. 1.5 month secondment to Rolls Royce (Germany)
- Application of check-pointed adjoint code to larger industrially relevant cases, publication, PhD thesis.

The project will be conducted in close liaison with network partners ESI and Rolls Royce Germany.

Required background

Essential: You need to have

- a good Masters degree (or equivalent) in Mechanical/Aerospace Engineering. Candidates with a Masters-level background in Applied Mathematics, Physics or Computer Science will also be considered if they have an acceptable background in modelling of fluid flow.
- experience with CFD code development (programming) as well as its application.

- the ability to give presentations and write scientific publications
- the willingness and ability to attend the regular network training events in the EU and to spend two 1.5 month secondments at network partners.

Desired: it would be good if you had experience with

- programming in Fortran90 and Linux environment, software development
- numerical optimisation,
- solving large systems of equations using libraries,

Conditions and environment

The salary is £37,400 per annum of which taxes, social contributions and pension payments have to be paid. Tuition fees for PhD enrolment will be waived by Queen Mary.

The network will provide a range of workshops on scientific aspects relevant to adjoint-based optimisation that will be directly or indirectly relevant to the work in this research position, see the About Flow webpage for details. You will also be offered a range of skills complementary to your core research area such as project management, thesis writing and entrepreneurial skills.

Queen Mary and the About Flow project are committed to Equal Opportunities for all candidates and will follow the principles of the European Charter for Researchers.

How to inquire and apply

Applications for the position are now open. For informal enquiries about this position please contact

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For contract conditions, administrative details and to download the application form please visit

<http://www.jobs.qmul.ac.uk/3449>

Application deadline is December 2, 2012.