Title: Computational Fluid Dynamics of Swallowing

Type of award: PhD Research Studentship

Department: Mechanical Engineering

Scholarship Details:
- University of Bristol Postgraduate Research Scholarships
- EPSRC Doctoral Training Partnerships
- China Scholarship Council Joint Scholarship
- Faculty of Engineering Dean’s Scholarship

If you are interested in this potential PhD project, please visit http://www.bristol.ac.uk/engineering/postgraduate/funding/ for more details on these general scholarships.

Duration: 3.5 years

Eligibility: Please use the above link and individual scholarships for further details on criteria for eligibility.

Start Date: 24 September 2018

PhD Topic Background/Description

Dysphagia, the medical term for swallowing difficulty/disorder, poses acute health risks (e.g., pneumonia, suffocation) as well as severely negatively impacting the lifestyle of individuals in several ways. Dysphagia is prominent predominantly in children, the elderly, and individuals with complications such as neurological related impairment (e.g., post-stroke, trauma), those who suffer mouth or throat cancer, have undergone surgery or targeted radiotherapy. A normal swallow is an impressively complex sequence of movements with four primary phases, requiring the coordination of more than 30 muscles located within the oral cavity, pharynx, larynx and oesophagus. The sequence of movements is regulated by a suite of sensory receptors located along the passages, and is a learned response. Consequently, dysphagia is considered a skill-based disorder. Due to the complexity of the swallowing mechanism, very little is known as to what therapy and protocol can be affected to alleviate the disorder, especially on a case by case basis for individual patients.

The project proposes the use of numerical modelling and simulation to provide a greater insight into the mechanisms of swallowing for individual patients. The analysis must consider several stages, which include the translation of the clinically acquired medical images to a computational domain, the simulation of the ingested bolus as a complex non-Newtonian fluid, the activation of the sensory receptors and the signalling pathways that lead to the muscle activations. The complexity of the problem will demand the development of mathematical models and the software to solve this challenging problem.
The project is multidisciplinary and includes the collaboration of several medical centres, which will be able to provide valuable clinical insight and clinical data, as well as university facilities such as the new MRI scanner, and new high-performance computing cluster. The candidate will play a key role in liaising with the various groups.

URL for further information:
http://biofluids.blogs.ilrt.org/

Further Particulars

Candidate Requirements
A first in Maths, Physics or Engineering or similar is required.

Basic skills and knowledge required
Knowledge of fluid mechanics. Programming skills are expected. Good ability in mathematics and numerical methods. Knowledge of biology and bioengineering is desirable.

Funding Notes
If awarded, the successful candidate will be offered one or both of the following:
• full UK/EU/Overseas PhD tuition fees
• a tax-free bursary at the current RCUK rate (£14,553 p.a. in 2017/18)

Informal enquiries
Please contact Dr Alberto Gambaruto, alberto.gambaruto@bristol.ac.uk

For general enquiries, please email gsen-pgrs@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 Dr Alberto Gambaruto.

Closing date for applications 15 / 22 January 2018

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