



UCL

PhD Studentship in Mathematical/Physical Modelling

Collagen: a nanoscale rope made of twisted bundles of fibres

Applications are invited for a DTA studentship in the EPSRC-funded Industrial Doctorate Centre ‘Molecular Modelling and Materials Science’, to start in October 2009. The project is a collaboration between the UCL Department of Civil, Environmental and Geomatic Engineering (CEGE), the UCL Eastman Dental Institute (EDI) and the London Centre for Nanotechnology (LCN), and is supervised by Dr. Gert van der Heijden (CEGE) and Dr. Laurent Bozec (EDI).

Collagen is the most abundant protein in the human body and the fundamental building block of our skeleton, skin and cornea, giving strength and elasticity to these tissues. Variations in the collagen ultrastructure can lead to serious syndromes, yet the intrinsic relationship between structure and mechanical properties of collagen fibrils remains insufficiently understood. The aim of this project is to build and test a new bundle theory for the mechanical response of a collagen fibril that accounts for its internal helical ordering. The two supervisors have recently published a model for twisted collagen fibrils (*Biophysical Journal* **92**, 70-75, 2007) that provides a starting point for this research.

The project is modelling driven but the student will have access to LCN’s great expertise in experimental collagen research, including atomic force microscope (AFM) data for use in parameter estimation. The student, if interested, may also get actively involved in the experiments.

The student will join the active research environment of the virtual Centre for Nonlinear Dynamics within CEGE with specific interests in the application of nonlinear dynamics techniques to the mechanics of slender elastic structures both in engineering and the life sciences: electrodynamic space tethers, helical nanoribbons, supercoiled DNA molecules, etc. (see also <http://www.homepages.ucl.ac.uk/~ucesgvd> for group’s activities).

The Studentship is for three years and carries a stipend of £14,988 for the 2009/10 session, going up slightly each year. No tuition fees are payable and there is an allowance for consumables and travel. Applicants must have at least a 2.1 degree, or a relevant MSc, in Physics, Mathematics or Engineering. It is a condition of the EPSRC award that the student should have resided in the UK for the last three years (see <http://www.epsrc.ac.uk/PostgraduateTraining/StudentEligibility.htm> for precise eligibility details).

To apply, send a cover letter and CV to g.heijden@ucl.ac.uk. Applicants should at the same time apply to UCL by submitting the general PhD application form, available online at <http://www.ucl.ac.uk/admission/graduate-study/application-admission>, entering Civil, Environmental and Geomatic Engineering as the department and naming Dr. Gert van der Heijden as the proposed supervisor. The original should be sent to the UCL Admissions office with a copy to: Dr. G. van der Heijden, Department of Civil and Environmental Engineering, University College London, Gower St, London WC1E 6BT, UK.

Further information may be obtained from Dr. Gert van der Heijden (g.heijden@ucl.ac.uk, 020-7679 2727) or Dr. Laurent Bozec (l.bozec@ucl.ac.uk, 020-7915 1018).

The closing date for applications is **Friday 26 June 2009**. Interviews are planned shortly after this date.