University of Nottingham

PhD Scholarship in Engineering Science

Wave propagation in complex built-up structures – tackling quasi-periodicity and inhomogeneity

Supervisors:
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Project description:

Computing the dynamic response of modern aerospace, automotive and civil structures can be a computationally challenging task. Characterising the structural dynamics in terms of waves in a uniform or periodic medium is often an important first step in understanding the principal propagating wave modes.

Real mechanical structures are rarely fully periodic or homogeneous – variations in shape or thickness, boundaries and intersections as well as curvature destroy the perfect symmetry. The aim of the project is to extend periodic structure theory to wave propagation in quasi-periodic and inhomogeneous media such as stiffened structures. The modelling of waves can then be recast in terms of Bloch theory, which will be modified by using appropriate energy or flux conservation assumptions. The information about the propagating modes will then be implemented into modern high-frequency wave methods – such as the so-called *Dynamical Energy Analysis* developed in Nottingham - making it possible to compute the vibrational response of structures with arbitrary complexity at large frequencies.

The PhD programme contains a training element, which includes research work as well as traditional taught material. The exact nature of the training will be mutually agreed by the student and their supervisors. The graduate programmes at the School of Mathematical Sciences provide a variety of appropriate training courses.

The successful applicant would:

i) be in possession of (or be expecting to obtain) a 1st class degree (BSc or Msc) in Mechanical Engineering or a relevant discipline and
ii) have excellent analytical skills and a solid background in numerical modelling and/or structural dynamics.

The studentship provides an annual stipend of approximately £13,726 and full payment of Home/EU Tuition Fees and will cover up to four years of study, depending on the training needs of the candidate. The studentship is available immediately but could also be used for 2014/15 entry.

Informal enquiries should be addressed to Dr Tanner gregor.tanner@nottingham.ac.uk and/or Dr Chronopoulos dimitrios.chronopoulos@nottingham.ac.uk.
To apply, please access: https://my.nottingham.ac.uk/pgapps/welcome/. **This studentship is open until filled. Early application is strongly encouraged.**