BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Dr Lee Etchels

Position: Research Fellow
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SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas

Finite element analysis; structural analysis; computational modelling; numerical optimisation; periprosthetic femoral fractures; joint replacements; hip joint contact mechanics, mathematical tool development.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests:

Dr Lee Etchels is an Aerospace and Aeronautical Engineering graduate (University of Leeds), with PhD research on the optimisation of treatment methods for periprosthetic femoral fractures, using both computational modelling and experimental testing. Lee is a research fellow at the University of Leeds using computational modelling to assess the contact mechanics and implant survivability of hip replacement components.

Main research areas include:

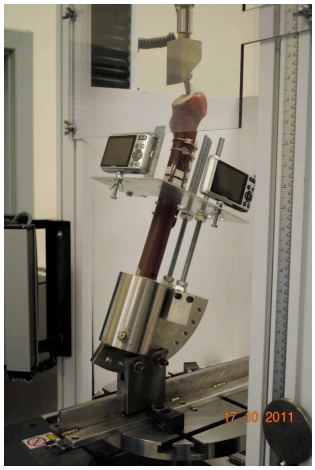
- Computational modelling of fracture fixation devices
- Mechanical testing of fracture fixation devices
- Dynamic modelling of hip replacement components
- Simulation of in vivo patient activities and loading profiles
- Numerical optimisation techniques for design modification and selection (including optimising the orientation of anisotropic materials in a structure)
- Development of clinical and research applications in open-source programming languages

Topics in which you would like to develop collaborative research:

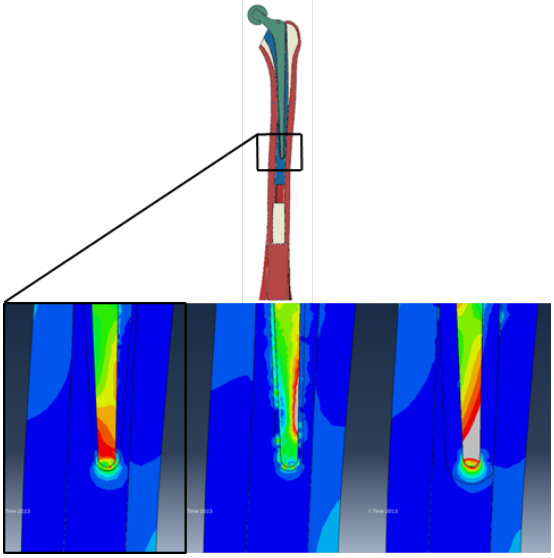
- Fracture fixation devices
- Improved joint replacement design
- Use of optimisation and computational models to define optimal usage of anisotropic material for biomedical function
- Devices and instrumentation for improving joint replacement positioning during surgery
- Measurement of joint displacements and loading for inputs and boundary conditions to computational models
- Computationally efficient modelling techniques, including intelligent search mechanisms and model reduction techniques
- Adaptive biomechanical modelling, where the inputs and boundary conditions to the model are dependent on the response of the model, as opposed to being fixed

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Currently working in collaboration with DePuy Synthes, previously worked with Stryker and Proctor & Gamble.

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Mechanical testing rig for periprosthetic femoral fracture treatments.


Von Mises stress results of computational models investigating the effect of cement distribution on stem fixation.

Publications and other outputs relevant to your interest in this programme (up to 5)

- Moazen, M., Mak, J.H., Etchels, L.W., Jin, Z., Wilcox, R.K., Jones, A.C., Tsiridis, E., 2013. The effect of fracture stability on the performance of locking plate fixation in periprosthetic femoral fractures. J. Arthrop. 28, 1589-1595.
- Etchels, L.W., Moazen, M., Mak, J.H., Jones, A.C., Jin, Z., Tsiridis, E., Wilcox, R.K., 2013. Validating finite element models of periprosthetic femoral fractures treated with long stem revision using experimental results. Presentation to the 19th Congress of the European Society of Biomechanics, Patras, Greece.
- Etchels, L.W., 2014. Optimisation of fixation methods for Vancouver Type B2 and B3 periprosthetic femoral fracture treatment. PhD thesis, University of Leeds.
- Etchels, L.W., Moazen, M., Mak, J.H., Wilcox, R.K., Jin, Z., Tsiridis, E., Jones, A.C., 2014 Improved sensitivity from periprosthetic femoral fracture models using relaxed boundary conditions. Presentation to the 7th World Congress of Biomechanics, Boston, USA.
- Moazen, M., Mak, J.H., Etchels, L.W., Jin, Z., Wilcox, R.K., Jones, A.C., Tsiridis, E., 2014. Periprosthetic femoral fracture – a biomechanical comparison between Vancouver Type B1 and B2 fixation methods. J. Arthrop. 29, 495-500.