Universitas 21 PhD Scholarship report

Name: Craig Holloway

Title of thesis: Determining the Stability of Transversely Isotropic Fluids

Department: Mathematics

Institution visited: University of Auckland

Dates of visit: 15/2/16-4/3/16

A summary of what you did during your stay

This grant was used to visit Dr Richard Clarke at the University of Auckland, and focused on combining models of transversely isotropic fluids and active suspensions. We have successfully established a link between the two models, found missing components of the stress tensor commonly used to model suspensions of active rod-like particles, as well as how to include motility in the transversely isotropic framework. Through linking these models, we are also able to determine the value of parameters, in the transversely isotropic model, in terms of fundamental quantities. In future work we will examine the linear stability of nearly aligned and isotropic active suspensions, which include the extra contribution to the stress we have identified.

How the visit met the reasons stated in your application form, and/or any areas it fell short in

This visit met the stated reasons on my application form. I managed to carry out the mathematics I proposed, and build a relationship with Dr Clarke and other members of the Engineering science department; allowing for future collaborative work between Auckland and Birmingham to be carried out.

What benefits did you gain in relation to your research and personal development

I have improved my networking and organisational skills, as the short time I had in Auckland needed to be utilised fully. I have become more confident in explaining and developing ideas as part of a research group; this will help me to improve my research output.
State any plans you have to continue collaboration with the U21 partner university

I will continue my relationship with Dr Clarke at the University of Auckland to complete two papers, on the research initiated on this research trip.

What facilities or expertise did your host university have that are not available to you at the University of Birmingham

The University of Auckland was recently ranked as the top research university in New Zealand in the most recent national research assessment exercise, with the Department of Engineering Science, of which Dr Clarke is a member, ranked as the top engineering department in the country. The department is also strongly affiliated with the Auckland Bioengineering Institute, which has world-class expertise in both modelling and instrumentation, allowing for theoretical ideas to be tested experimentally. The research group at Auckland has expertise including (but not limited to) modelling of microorganism motility, tailored computational models, access to microfabrication facilities, and connections with companies working in the field of artificial reproduction, which are all related to this research.

Anything you would have changed about your visit

I would have stayed longer to make more progress with the research before leaving Auckland.