

Helena Ribera Ponsa

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Research Interests

Nanotechnology; Phase change; Heat transfer; Kirkendall effect; Partial differential equations (approximate solution methods and numerical techniques); Industrial applied mathematics.

Education

2014- Present Ph.D. student - Centre de Recerca Matemàtica
Supervised by Professor Tim Myers.

The goal of my thesis is to develop and analyse mathematical models of the growth or shrinkage of nanoparticles. The initial work will build on mathematical models of melting at the nanoscale, and will involve solving heat equations coupled to a phase change model, using approximate analytical and numerical methods.

2013-2014 M.Res. Complexity Sciences - University of Bristol
Distinction.

Project #1. Bio-inspired adaptive sonar navigation.
Supervised by Dr. Marc Holderied, Dr. Luca Giuggioli and Dr. Dieter Vanderelst.
Project #2. Ant-based nanoparticle strategies for the imaging of rare tumour events.
Supervised by Dr. Sabine Hauert and Professor Nigel Franks.

2008-2012 B.Sc. Mathematics - Universitat de Barcelona
Operators on Spaces of Analytic Functions.
Supervised by Professor Jordi Pau Plana.

Employment History

May 2014 - University of Bristol

Aug. 2014 *PGR Engagement Intern*

I worked with the UBU Postgraduate Network to audit and analyse engagement and representation of postgraduate researchers across the University, including communications channels, the processes for recruiting PGR reps, and access to training opportunities.

Oct. 2012 - Centre de Recerca Matemàtica

Jun. 2013 *Research Assistant*

I worked within the Industrial Mathematics Group in two problems: nanofluids and phase change at the nanoscale. I learned about perturbation theory and some numerical techniques, both in the PDEs context.

Research visits

Sep. 2016 - Visiting International Research Student - The University of British Columbia

Nov. 2016 *Supervised by Professor Brian Wetton.*

Three-month visiting researcher at the Institute of Applied Mathematics (IAM) as part of my Ph.D. working on the nano-Kirkendall effect.

Journal and Proceedings papers

- [1] M. Calvo Schwarzwälder, **H. Ribera**, and T. G. Myers. One-phase reduction of the spherical Stefan problem with a variable latent heat. In preparation.
- [2] V. Cregan, T. G. Myers, S. L. Mitchell, **H. Ribera**, and M. Calvo Schwarzwälder. Nanoparticle evolution via the precipitation method. In preparation.
- [3] T. G. Myers, **H. Ribera**, and V. Cregan. Does mathematics contribute to the nanofluid debate? Submitted to Scientific Reports, July 2016.
- [4] **H. Ribera**, and T. G. Myers (2016). A mathematical model for nanoparticle melting with size-dependent latent heat and melt temperature. *Microfluidics and Nanofluidics*, 20, 147.
- [5] R. Bacsa, W. Bacsa, M. Calvo Schwarzwälder, V. Cregan (report coordinator), M. Fernandez-Pendas, S. Fernandez-Mendez, B. Florio, N. Gómez Bastus, A. Marquina, I. Moyles, T. G. Myers, **H. Ribera**, S. Rusconi, S. Serna, C. Vázquez-Cendón, and J. Piella (2016). Synthesis of monodisperse spherical nanocrystals. *Proceedings of the 115th ESGI*, Centre de Recerca Matemàtica (Spain).
- [6] T. G. Myers, M. M. MacDevette, and **H. Ribera** (2013). A time-dependent model to determine the thermal conductivity of a nanofluid. *Journal of nanoparticle research*, 15(7), 1-11.

Conferences and invited talks

- [1] Applicable Analysis Seminar. Department of Mathematics, Simon Fraser University (Canada). November 2016.
- [2] **H. Ribera** and T. G. Myers. *Mathematical modelling of nanoparticle evolution: Phase change and the Kirkendall effect*. Nanomath 2016. CEMES-CNRS (France). June 2016.
- [3] V. Cregan, T.G. Myers, H. Ribera and M. Calvo Schwarzwälder. Models of Diffusion Phenomena from Nanoscience. Nanomath 2016. CEMES-CNRS (France). June 2016.
- [4] **H. Ribera** and T. G. Myers. *A model for nanoparticle melting with a Newton cooling condition and size-dependent latent heat*. ECMI 2016. University of Santiago de Compostela (Spain). June 2016.
- [5] V. Cregan, T.G. Myers, H. Ribera and M. Calvo Schwarzwälder. Nanoparticle growth via the precipitation method. ECMI 2016. University of Santiago de Compostela (Spain). June 2016.

Workshop participation

- [1] Graduate Mathematical Modelling in Industry Workshop. The University of British Columbia (Canada). August 2016.
- [2] 115th ESGI. Centre de Recerca Matemàtica (Spain). January 2016.
- [3] 110th ESGI. University of Limerick (Ireland). June-July 2015.
- [4] Student Mathematical Modelling Workshop. University of Limerick (Ireland). June 2015.

Referees

Name Timothy G. Myers
Position Senior Researcher.
Centre de Recerca Matemàtica.
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Name Brian Wetton
Position Professor.
The University of British Columbia.
Vancouver, BC, Canada.
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