Project acronym: MULTIMAT

Project ID:505226

Project participant: Max Planck Institute for Mathematics in the Natural Sciences

ER: Dr Jonathan Bevan

Nationality: British

Previous place of work: Oxford University

Start Date: 01/10/05

Duration: 12 months

Category: ER

Place: Leipzig

Country: Germany

My scientific background is mathematical: I read mathematics at Oxford, followedby a PhD under the supervisionof Prof. John Ball. I held an EPSRC Postdoctoral Research Fellowship in Oxford from 2003-2005, after which Ibecame anRCUK AcademicFellow in Mathematics in the Department of Mathematics, University of Surrey. I spent the year 2005-2006 at the Max PlanckInstitute for Mathematics in the Sciences at the invitation of Prof. Stefan Muller. Thisyearwas fundedby the MULTIMAT network,in whichI had noresponsibilities otherthanto undertakea researchproject suggestedbyProf. Muller. Theyearwasaproductive one,andI wasvery gratefultobe ableto work at MPI Leipzig, especially in view of the manyseminars given there. The staff at the Institute were always extremely helpful, particularly when relocating myfamilyto Leipzig(albeittemporarily).Ihadno negativeexperiences during my time as a MULTIMAT researcher.

Iinteracted with the ER and ESR of the Oxford node through the Cambridge Multimat conference and during a subsequent week long visit. The research project aimed to study the energy landscape of a functional E which models the formation of microstructure in elastic cystals. The model contains a surface energy term: this plays a role in showing that the austenite phase is metastable. In practicethis meansthattheidentityfunctionisalocal minimizerofEinan appropriate function space. Our approach to this problem hasbeen to use the ideas of Kohn, Muller, and others, to write down the scaling of the minimum of E on ‘rings’ of functions surrounding the identity. As the ‘ring radius’ changes we see different energy scalings, and differentpossibilities for the associated microstructure. The mechanisms involved in the minimization problem for very smal radii are delicate; for larger radii the situation is easier to deal with.