

ME/MS 260A Final Project

Micromechanics - Spring 2013-14

Proposal due: April 24, 2014

Written report due: May 20, 2014

Oral Presentation: June 4-6, 2014

Rules

1. This project is worth half the points on the final grade.
2. It is recommended that you work with a partner on this project.
3. You have to define your own project. A few suggestions are given below, but you are welcome to design your own.
4. The proposal is 1-2 pages (type-written) and should spell out the objectives and the scope. The instructor/teaching assistant will give you comments based on the proposal.
5. The written report is 5-10 pages (type-written). It should describe the problem, provide a background to the problem, describe the results, provide a commentary on the results and have a bibliography.
6. The oral presentation is for half hour.

Possible Projects

1. Study of Ferroelectric/paraelectric phase transition in barium titanate [1].
2. Studying connection between special lattice parameters and hysteresis [2], [3]
3. Study of phase field models
4. Ostwald Ripening [4]
5. Dislocation microstructure [5], [6]

References

- [1] Shu Y. C. and Bhattacharya K., Domain patterns and macroscopic behavior of ferroelectric materials, *Philosophical Magazine B*, **81** (2001), 2021 - 2054.
- [2] Zhang Z., James R. D., Muller S., Energy barriers and hysteresis in martensitic phase transformations, *Acta Materialia*, **57** (2009), 4332-4352

- [3] Cui J., Chu Y. S., Famodu O., Furuya Y., Hattrick-Simpers J., James R. D., Ludwig A., Thienhaus S., Wuttig M., Zhang Z., and Takeuchi I., Combinatorial search of thermoelastic shape memory alloys with extremely small hysteresis width, *Nature Materials*, **5** (2006), 286-290.
- [4] Ratke L. and Voorhees P. W., Growth and coarsening : Ostwald ripening in material processing, *Berlin; New York: Springer* (2002)
- [5] Conti S., Ortiz M., Dislocation Microstructures and the Effective Behavior of Single Crystals, *Arch. Rational Mech. Anal.*, **176** (2005) 103-147
- [6] Ortiz M., Repetto E. A. and Stainier L. A theory of subgrain dislocation structures, *J. Mech. Phys. Solids*, **48** (2000), 2077-2114