

arXiv.org > cond-mat > arXiv:1106.3573

Condensed Matter > Materials Science

The Formation and Coarsening of the Concertina Pattern

Jutta Steiner, Holm Wieczoreck, Rudolf Schäfer, Jeffrey McCord, Felix Otto

(Submitted on 16 Jun 2011)

The concertina is a magnetization pattern in elongated thin-film elements of a soft material. It is a ubiquitous domain pattern that occurs in the process of magnetization reversal in direction of the long axis of the small element. Van den Berg argued that this pattern grows out of the flux closure domains as the external field is reduced. Based on experimental observations and theory, we argue that in sufficiently elongated thin-film elements, the concertina pattern rather bifurcates from an oscillatory buckling mode. Using a reduced model derived by asymptotic analysis and investigated by numerical simulation, we quantitatively predict the average period of the concertina pattern and qualitatively predict its hysteresis. In particular, we argue that the experimentally observed coarsening of the concertina pattern is due to secondary bifurcations related to an Eckhaus instability. We also link the concertina pattern to the magnetization ripple and discuss the effect of a weak (crystalline or induced) anisotropy.

Subjects: **Materials Science (cond-mat.mtrl-sci)**; Analysis of PDEs (math.AP); Pattern Formation and Solitons (nlin.PS)

Cite as: arXiv:1106.3573 [cond-mat.mtrl-sci] (or arXiv:1106.3573v1 [cond-mat.mtrl-sci] for this version)

Submission history

From: Jutta Steiner [view email] [v1] Thu, 16 Jun 2011 16:24:07 GMT (6757kb)

Which authors of this paper are endorsers?

Link back to: arXiv, form interface, contact.

We gratefully acknowledge supp the Simons Fo and member ins

Search or Article-id

(<u>Help</u> | <u>Advance</u> All papers

Download:

- PDF
- PostScript
- Other formats

Current browse cont cond-mat.mtrl-sci

< prev | next >
new | recent | 1106

Change to browse b

cond-mat math math.AP nlin nlin.PS

References & Citatio
NASA ADS

