



Condensed Matter > Statistical Mechanics

# A diffusion-induced transition in the phase separation of binary fluid mixtures subjected to a temperature ramp

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(Submitted on 8 Jul 2011)

Demixing of binary fluids subjected to slow temperature ramps shows repeated waves of nucleation which arise as a consequence of the competition between generation of supersaturation by the temperature ramp and relaxation of supersaturation by diffusive transport and flow. Here, we use an advection-reaction-diffusion model to study the oscillations in the weak- and strong-diffusion regime. There is a sharp transition between the two regimes, which can only be understood based on the probability distribution function of the composition rather than in terms of the average composition. We argue that this transition might be responsible for some yet unclear features of experiments, like the appearance of secondary oscillations and bimodal droplet size distributions.

Comments: 6 pages, 3 color figures  
 Subjects: **Statistical Mechanics (cond-mat.stat-mech)**; Soft Condensed Matter (cond-mat.soft); Atmospheric and Oceanic Physics (physics.ao-ph)  
 Journal reference: EPL 100 (2012) 16001  
 DOI: [10.1209/0295-5075/100/16001](https://doi.org/10.1209/0295-5075/100/16001)  
 Cite as: **arXiv:1107.1751 [cond-mat.stat-mech]**  
 (or **arXiv:1107.1751v1 [cond-mat.stat-mech]** for this version)

## Submission history

From: Jürgen Vollmer [[view email](#)]  
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