Polymer Adsorption onto a Stripe-Patterned Surface

Momchil Ivanov

Universität Leipzig
Fakultät für Physik und Geowissenschaften
Institut für Theoretische Physik

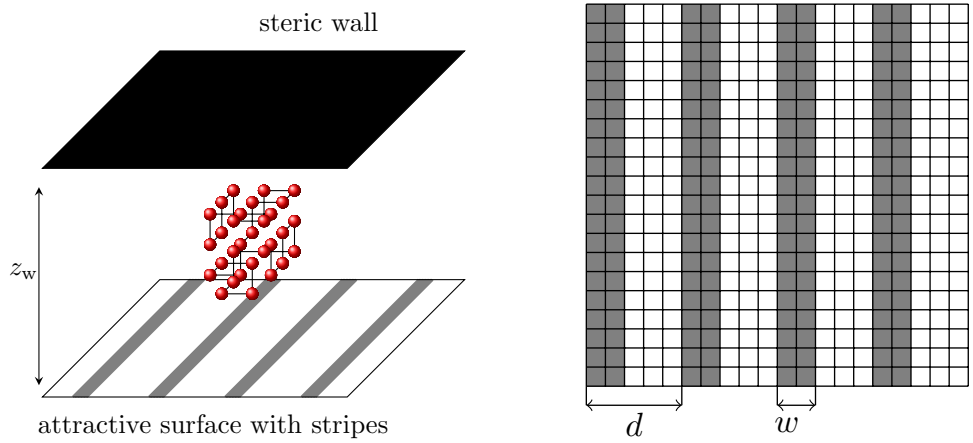
28.11.2013

Introduction

Motivation

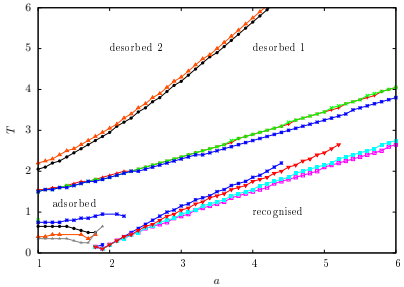
- The main objective of this project is to gain a better understanding of adsorption properties and recognition of surface patterns of macromolecules.
- The competition of internal and external constraints gives rise to very rich phase diagrams.
- Here the focus is on adsorption onto a stripe-patterned flat surface using exact enumerations within a lattice model.

The system

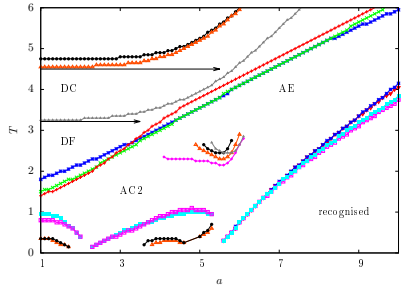


Results

Weak

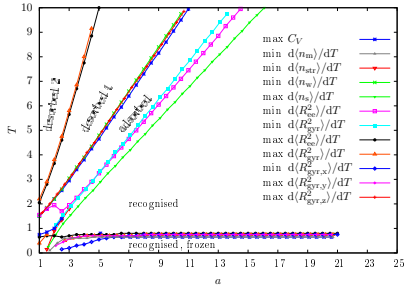


Strong

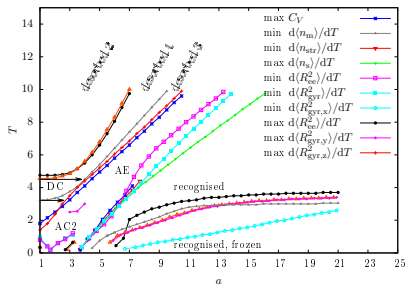


Narrow stripes ($w = 1, d = 5$)

Weak



Strong



Wider stripes ($w = 2, d = 5$)

- Pseudo-phase diagrams: Temperature T vs. pattern attraction a.
- Non-grafted polymers with $N = 15$ monomers.
- Canonical analysis.
- Microcanonical analysis (first-order phase transitions).
- Also studied: Grafted vs. non-grafted.

Conclusions

Two main pseudo-phases:

- Adsorbed (A)
- Desorbed (D)

Main sub-phases:

- Collapsed (C)
- Extended (E)
- Frozen (F)
- Recognized

Thank you!