Prifysgol Abertawe
Swansea University

University of Swansea

Masters Dissertation

BL1: Interfaces in the 2D Potts model

Author:
Robert James

Supervisor:
Professor Biagio Lucini

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Abstract

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Chapter 1

Introduction

In the field of Computational Physics, there is a large interest in lattice simulation. One of the most simple models that still exhibits non trivial behaviour is the q-state Potts Model. By Restricting the Potts model to 2 or 1 dimension(s) and the constraining the number of independent states,$q = 2$ you can determine the behaviour at high,low and critical temperatures analytically[1] this is known as the Ising Model.

This dissertation will be looking at directly determining the interface free energy as a ratio of the partition functions.

$$F_I(L) = -\log \frac{\tilde{Z}(L)}{Z(L)} + \log(L) \qquad (1.1)$$

From the interface free energy above we can calculate the interface tension σ.

$$\sigma = \lim_{L \to \infty} \frac{F_I(L)}{L^{D-1}} \qquad (1.2)$$

Chapter 2

Theory

The Potts Model

Chapter 3

Code

Chapter 4

Results

Chapter 5

Discussion of Results

Bibliography

[1] Elliott W. Montroll, Renfrey B. Potts, and John C. Ward. Correlations and spontaneous magnetization of the two dimensional ising model. *Journal of Mathematical Physics*, 4(2):308–322, 1963.