# Mijn Titel

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# Contents

# Abstract

Samenvatting bla bla

# Acknowledgements

Ik wil bedanken ...

# 1
# Introduction

We investigate finite-size scaling behaviour in two-dimensional classical systems using the corner transfer matrix renormalization group (CTMRG) method. Instead of scaling in the system size $N$, we perform a scaling analysis in the bond dimension – or numbers of basis states kept – in approximating the corner transfer matrix of the system. This dimension is denoted $m$, though in other works it may appear as $\chi$.

This thesis is laid out as follows. Chapter two introduces the density matrix renormalization group (DMRG) method in the context of one-dimensional quantum systems. Since most of the literature and research focuses on quantum lattice models, it is helpful to keep this picture in mind.

Chapter three explains how the ideas of DMRG can be applied to two-dimensional classical lattices. After making this connection clear, the corner transfer matrix renormalization group (CTMRG) method, a combination of DMRG and earlier ideas from Baxter, is introduced.

Chapter four introduces the concepts of critical behaviour and finite-size scaling, while chapter five makes the connection to finite-size effects that appear as a consequence of a finite bond dimension $m$ within the CTMRG method.

Chapter six describes implementation details and convergence behaviour of the CTMRG algorithm. Chapter seven presents numerical results of finite-$m$ scaling for the Ising model.

Chapter eight introduces the clock model and the basic concepts of the Kosterlitz-Thouless transition, presents results of finite-$m$ scaling and compares with works using other numerical methods.