

The Ising model is widely studied model in statistical physics. In this thesis, we review methods used to solve it and we concentrate on the state at the critical temperature, where the system exhibits phase transition and can be described by means of conformal field theory (CFT). This description comes with a new insight into the problem and enables to study boundary effects. Critical behavior for systems with boundaries is often described by conformally invariant boundary conditions. Classification of all boundary CFTs still remains an open problem.

We discuss methods developed recently in string field theory (SFT) proposing a new approach and we illustrate it on the Ising model. Knowing a solution to the SFT equations of motion, one can construct corresponding boundary state describing consistent conformally invariant boundary condition. We have formulated SFT for the Ising model, found new solutions numerically, and constructed corresponding boundary states. This procedure avoids solving difficult sewing constraints and results agree with exact values. Unlike the renormalization group approach, where we are limited by the g-theorem, we can construct also states with higher energy. Conformal defects and correspondence with free boson on S^1/\mathbb{Z}_2 orbifold is also discussed. This thesis is based on forthcoming paper [1].