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25 Years of the Edwards Model

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POLYMERS ON FRACTAL LATTICES

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ABSTRACT

We study the critical exponents of self avoiding walks on a family of Sierpinski-type fractals. The members of the family are characterized by an integer b. For large values of b, both the Hausdorff and the spectral dimensions of the fractals tend to 2 from below. We use finite size scaling theory to determine the first two terms in the asymptotic expansions of size exponent ν and the susceptibility exponent γ for large b. The results are compared to predictions of phenomenological theories such as Flory's, and to the ϵ-expansion techniques.

1. Introduction

In these lectures, I shall be discussing properties of linear polymers on fractal lattices. I shall emphasize the general approach, and not computational details which are available elsewhere [1].

It is desirable to understand the motivations for such a study. Firstly, it helps us understand the polymers better. We know that many qualitative properties of polymers can be understood in terms of the excluded volume interaction, the simplest form of which is the Edwards' hamiltonian whose 25^{th} anniversary we are celebrating here. With a lattice regularization, and in the limit of interaction strength going to infinity, the Edwards model becomes the self-avoiding walk (SAW) problem. But this SAW problem has not been solved exactly on any regular lattice other than in the trivial one dimensional case. It *can* be solved exactly

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