

1) Cumulant expansion

Consider the Ising model on a square lattice in 2 dimensions. Define block spins built of three neighbouring spins on a triangle. The Hamiltonian is splitted into

$$H = H_0 + V$$

where H_0 is the interaction inside the triangle blocks, and V is the interaction between spins living in different blocks. Calculate the averages

$$\langle V \rangle_0, \quad \langle V^2 \rangle_0$$

and use them to construct the blocked hamiltonian in 2nd order of the cumulant expansion, and calculate the critical exponent ν !