TFY4235/FY8904 Computational Physics, Spring 2013

Problem Set 11

Problem 1.

we will in this problem try to determine the ground state of an Ising spin glass — a horribly difficult problem. Assume a quadratic lattice with periodic boundary conditions. Each node i has a spin S_i taking values -1 and 1 associated with it. The hamiltonian is

$$H = -\sum_{\langle i,j \rangle} a_{i,j} S_i S_j \tag{1}$$

where $\langle i, j \rangle$ runs over nearest neighbor nodes. $a_{i,j}$ is 1 or -1 with equal probability. Generate 5×5 realizations and use simulated annealing, simulated tempering and a genetic algorithm to determine the ground state.