20 February 2020

Question 1: Ising Model

Setup a 2D Ising model using periodic boundary conditions (discussed in the class).
Explicitly show the functions/subroutines using comments in the code for the following.

- To setup the initial configuration of 2D spins.
- To calculate the energy of the lattice of spins.
- Implementation of metropolis criterion.

Report the following for lattice sizes of 4×4, 8×8 and 12×12.
Machines with decent processors can easily handle lattice sizes upto 50×50. Please report results with 50×50 (if you can)

a) Plot showing specific heat as a function of temperature.
b) Generate a movie of lattice evolution (or) show the initial and final configuration of the lattice at $T = 1.0, 1.5, 2.0$ and 3.0.

Question 2: Kawasaki Dynamics

Setup a 2D Ising model accounting for spin conservation and using periodic boundary conditions (discussed in the class).

Report the following for lattice sizes of 4×4, 8×8 and 12×12.
Machines with decent processors can easily handle lattice sizes upto 50×50. Please report results with 50×50 (if you can)

a) Generate a movie of lattice evolution (or) show the initial and final configuration of the lattice.