ECE 18-316 Problem Set 5 addendum

Notes:

1a)

The expression for the energy density, e_{ex} , should not contain a d. This is a typo.

To find z,

a) sketch an fcc unit cell

b) select an atom, ATOM0, to act as the sample atom for counting

c) count the total number of nearest neighbors of ATOM0 which have a spin rotation relative to the spin of ATOM0. Consider all directions, and keep track of the plane of the domain wall (100)d) divide this number by 2 to avoid double counting when you move on to another atom

e) Use this number for z

To find d,

a) Find the distance between ATOM0 and its nearest neighbors in the direction perpendicular to the wall plane. This will not be the same as the distance to its nearest neighbors.

To find Ω

a) Count atoms (and fractional atoms) in the unit cellb) Divide the unit cell by this number.

Note: The choice of the (100) direction is arbitrary and for convenience in this problem. The same answer is obtained if the domain wall is treated as being in the (111) plane, if the above protocol is followed.

1c) Should include the words calculate the demagnetizing energy.

1d) Should be italicized in the following way for clarity "... as a function of a, for a varying from d for fcc Fe to 10 um ..."