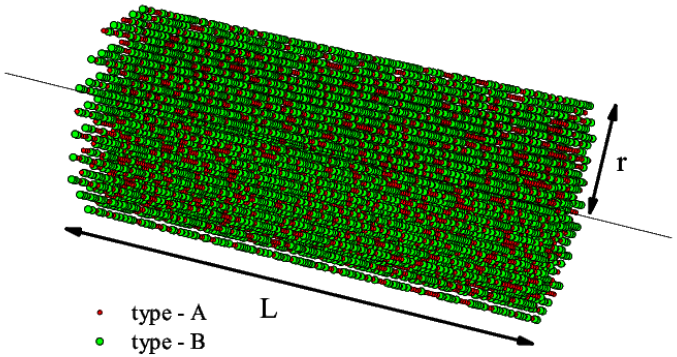
Monte Carlo study of hysteresis features of a cylindrical nanowire under quenched disorder



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- Binary alloy nanowire of the type A_pB_{1-p} with L=200 r=10.
- Located on a simple cubic lattice.
- Type-A (spin-1/2) and type-B (spin-1) magnetic components are distributed randomly over the lattice sites.
- Free boundary conditions in x- and y- directions and periodic boundary conditions in z-direction.

$$\hat{H}_{ex} = -\sum_{\langle i,j \rangle} \left[J_{AA}\delta_{iA}\delta_{jA}\sigma_i\sigma_j + J_{BB}\delta_{iB}\delta_{jB}S_iS_j + J_{AB}\left(\delta_{iA}\delta_{jB}\sigma_iS_j + \delta_{iB}\delta_{jA}S_i\sigma_j\right)\right]$$

$$\hat{H}_{Zeeman} = -H\sum_i (\delta_{iA}\sigma_i + \delta_{iB}S_i)$$

- Algorithm: Single-spin-flip Metropolis algortihm.
- All the exchange interaction terms (J_{AA} , J_{BB} and J_{AB}) are ferromagnetic.

✓**It is possible to modify the magnetic properties (coercivity, remanence as well as hysteresis loops) of the nanowire by varying p and J_{AB}.**