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1 Global Swap Algorithm

1. MCS + 1, Time + $\frac{1}{4L^2 10^6}$
2. Then we choose two random positions in the system, say i & j. (Since its global swap, they do not have to be neighbors.)
3. We then consider whether we will accept this SWAP between i & j, which is based on SWAP rate.
4. To Calculate SWAP rate.
   (a) We set ΔE as the change of system energy due to this SWAP (simply meaning SWAP positions i & j).
   (b) For i & j, if they are both voids, we set $\Delta E = 0$.
   (c) If not, we consider their surrounding particles Ki, Kj. (Ki represents the surrounding particles of i). Then, say position i has a particle Pi, we make $\Delta E + \Sigma bond(Pi, Ki) - \Sigma bond(Pi, Kj)$. Similar for Pj.
   (d) $\omega_0 = 10^6, E_0 = 1.5$

$$\text{SWAP rate} = \begin{cases} \omega_0 exp(-\frac{E_0}{K_B T}) & \Delta E > 0 \\ \omega_0 exp(-\frac{E_0 + \Delta E}{K_B T}) & \Delta E \leq 0 \end{cases}$$

5. accept the swap with probability $\frac{\text{SWAP rate}}{10^6}$
6. If accepted, we swap the positions of i & j, and change the energy of the system based on ΔE.