Continuum percolation in dipolar fluids

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At the end of this page, and also in the conclusions of the paper, we mention use of the first-order y-expansion of Gubbins and Gray as a possible approach for studying the dependence of the dipole–dipole interaction on the critical percolation density in dipolar hard-sphere fluids. In fact, this approximation gives the same critical density as the reference hard-sphere fluid. However, the cluster size given by this approximation does depend on the dipolar strength.

In formula (44), it should be understood that the sum has, in general, infinite terms. The limitation to the four terms indicated in our paper is just an approximate truncation scheme.

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From equation (50), $g^{\dagger}(\mathbf{1},\mathbf{2})$ in equation (19) becomes simply

$$g^{\dagger}(\mathbf{1},\mathbf{2}) = g^{\dagger 000}_{\mathrm{MSA}}(r)\exp[-\beta\omega(\mathbf{1},\mathbf{2})].$$

Therefore, in equation (45), $(h^{\dagger}(\mathbf{1},\mathbf{2}))^{000}$ is

$$(h^{\dagger}(\mathbf{1},\mathbf{2}))^{000} = \tfrac{1}{2}g^{\dagger 000}_{\mathrm{MSA}}(r)\int_{-1}^{1}\mathrm{d}z\, i_0(\mu^{*2}(1+3z^2)^{1/2}/r^3).$$

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The last line in the RHS of equation (A2) should read

$$q_3(r-1) \qquad 1<r<\alpha.$$

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The second term in the RHS of equation (A7) should be

$$(\bar{a}r+\bar{b}+\bar{a})\delta_{1m}$$

Also the second and third lines in equation (A10) should be corrected to

$$q_1(\alpha-1) = q_2(\alpha-1) = [\bar{a}(\alpha-1)^2/2+\bar{b}(\alpha-1)]\delta_{1m}+\bar{c}$$
$$q_3(0) = q_2(1) = (\bar{a}/2+\bar{b})\delta_{1m}+\bar{c}$$