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Erratum

Stochastic Model of a One-Dimensional Fluid[1]

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The derivation of z given on p. 157 of this paper[1] was based on the standard thermodynamic relation $\partial \ln z/\partial p = 1/\alpha$. For explicitly density-dependent potentials this relation is not quite true. From the expression for the Gibbs free energy

$$G(p, N) = -N \ln \int_0^\infty e^{-px} e^{-\phi(x,p)}\, dx$$

we see that

$$dG(p, N) = \left[L + N\left\langle \frac{\partial \phi}{\partial p} \right\rangle\right] dp + \left[\mu + \int^p \left\langle \frac{\partial \phi}{\partial p} \right\rangle dp\right] dN$$

where

$$\left\langle \frac{\partial \phi}{\partial p} \right\rangle = \int_0^\infty \frac{\partial \phi(x, p)}{\partial p}\, \alpha P_0{}^\alpha(x)\, dx$$

The total chemical potential has a contribution coming from "polarization" effects. The activity z derived in this paper really represents e^μ with μ defined

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as above. This also affects the proof of density dependence on p. 161. The expression following Eq. (20) should instead read

$$\left[L\left(\frac{\partial p}{\partial \alpha}\right) + N\frac{(1 - \partial p/\partial \alpha)}{\alpha} - N\left\langle\frac{\partial \phi}{\partial \alpha}\right\rangle\right]P(N, L) - \frac{N + 1}{\alpha}P(N + 1, L)$$

which leaves the required proof inconclusive. However, the fact that the pair potential is explicitly density dependent can be proved easily by observing that in the region $\sigma < x < 2\sigma$ we have $P_0^{(\infty)}(x) = 1$, yielding $\partial\phi/\partial x = -p$, which is clearly density dependent.