Derivation of the Van-der-Waals equation of state from classical equilibrium statistical mechanics of two particle system

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Abstract

Two particle system in the spherical volume is considered in the framework of classical equilibrium statistical mechanics. Interaction potential of particle with the wall of the spherical volume is equal to hard sphere potential. It is shown that Van-der-Waals equation of state can be obtained approximately for two particles interacting via potential of London if the center of mass of the particles is fixed at the center of spherical volume.