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Statistical Mechanics of Liquids

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1 Introduction

1.1 Course Outline

2 Basic Statistical Mechanics

some intro

2.1 Ensembles

2.2 Perfect Gasses

3 Imperfect Gasses

4 Distribution Functions

4.1 Potential of Mean Force

4.2 The Superposition Approximation

5 Integral Equations for $g(r)$

5.1 The Kirkwood Equation

The goal of this section is to derive an integral equation for the pair-distribution function called the Kirkwood equation. The starting point is the identity

$$kT\ ln\left(\rho^{(n)}(\boldsymbol{r}_1,..,\boldsymbol{r}_n;\xi)\right) = kT\ ln\left(\rho^{(n)}(\boldsymbol{r}_1,..,\boldsymbol{r}_n;\xi=0)\right) + \int_0^{\xi} d\xi' \frac{\partial}{\partial \xi'} kT\ ln\left(\rho^{(n)}(\boldsymbol{r}_1,..,\boldsymbol{r}_n;\xi')\right). \tag{5.1}$$

5.1.1 Numerical Solution

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