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Thermodynamic Simulations of Rigid Spherical ‘Balls’ of Gas in a Fixed Container

*including of Inelastic Collisions in a Container, Ideal Gas Relationships, Conservation Laws, the Ideal Gas Laws, the Van der Waals Law, and the Maxwell-Boltzmann Distribution*

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*Abstract* – 2D-thermodynamic simulations were performed for a fixed number of rigid *spherical ball* approximations of atoms, within a circular container of fixed area over a set number of collisions. This initially examined the collisions of a single ball within a circular container, before being extended to encompass multiple balls, and producing various plots of properties of the system and the ball over time. In particular, with relation to the laws governing an ideal gas, conservation of various properties, Van der Waals forces and the Maxwell-Boltzmann distribution. Our simulation was found to be in agreement with all theoretical distributions.

I Introduction & Theory

It has long been theorised that the erratic movement of various particles in mediums can be explained through particle collisions, mostly notably in 1827 where Robert Brown observed the movement of pollen grains suspended in water. From this motion, he deduced that this must be the product of bombardment with water molecules. coined Brownian motion in his honour.

With electromagnetism entering the picture, new discoveries were gradually incorporated into this model, according for deviations from the Ideal Gas model, namely intermolecular forces such as the Lennard-Jones potential which

II Method & Data Collection

III Results & Analysis

IV Conclusion

V Appendicies & Figures

VI References