Simulation of a gas-driven rocket engine

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This is an abstract Complete this summary at the end of the paper

I. INTRODUCTION

Rocket engines, while highly advanced, still simply utilize Newton's laws of motion. More specifically the third law, which states "For every action, there is an equal and opposite reaction". We want to propel our rocket engine as fast as possible upwards into space. Our rocket will be filled with hot H_2 gas under high pressure which we will expel out the end of the rocket engine. Write more on the simulation and theory

II. THEORY

To complete the calculations for the engine we are going to use a lot of statistics to simplify the behavior of the gas particles.

III. METHOD

IV. RESULTS

V. DISCUSSION

VI. CONCLUSION

VII. REFERENCES

VIII. APPENDIX: MATHEMATICAL DERIVATIONS

Challenge A.3.1

$$\langle v \rangle = \int_0^\infty vP(v)\, \mathrm{d}v$$

$$\int_0^\infty x^{\frac{3}{2}} e^{-x} \mathrm{d}x = \frac{3}{4}\sqrt{\pi}$$

We try to rewrite the first integral to fit the form of the second

$$\int_0^\infty vP(v)\, \mathrm{d}v = \int_0^\infty \left(\frac{m}{2\pi kT}\right)^{\frac{3}{2}} e^{-\frac{1}{2}\frac{mv^2}{kT}} 4\pi v^3$$

$$\frac{4}{\sqrt{\pi}} \int_0^\infty \left(\frac{mv^2}{2\pi kT}\right)^{\frac{3}{2}} e^{-\frac{1}{2}\frac{mv^2}{kT}}$$

We use substitution to get the aforementioned integral

$$\frac{4}{\sqrt{\pi}}\frac{3}{4}\sqrt{\pi} = 3$$