

Part 1: Electron Modelling

```
>> ELEC4700_assign1
The mean free path is : 4.579939e-08 metres
```

Figure 1: MATLAB Mean Free Path Calculation Statement

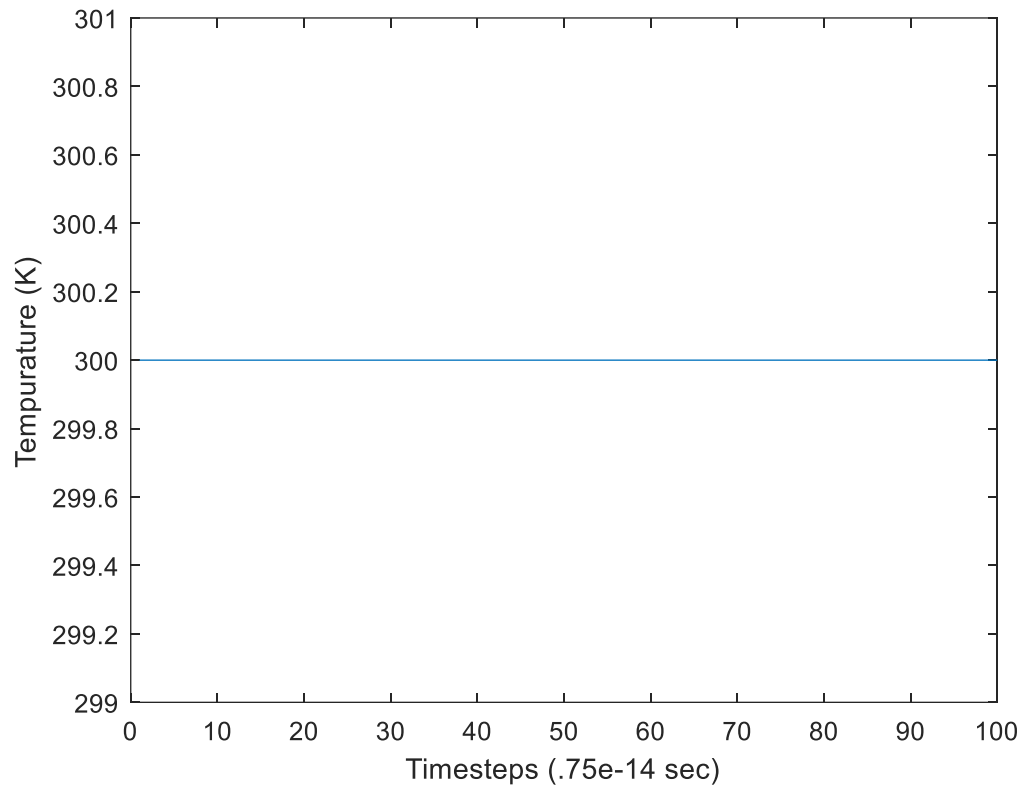


Figure 2: Temperature Plot

```
Vefcn = @(T) sqrt(3 .* c.k .* T ./ c.m_n); %function for avg e velocity given temperature
```

Figure 3: Function To Calculate Velocity Given Temperature

```
>> Vefcn(c.T)

ans =

    2.2900e+05
```

Figure 4: Equations Output When Given A Temperature Of 300 Kelvin

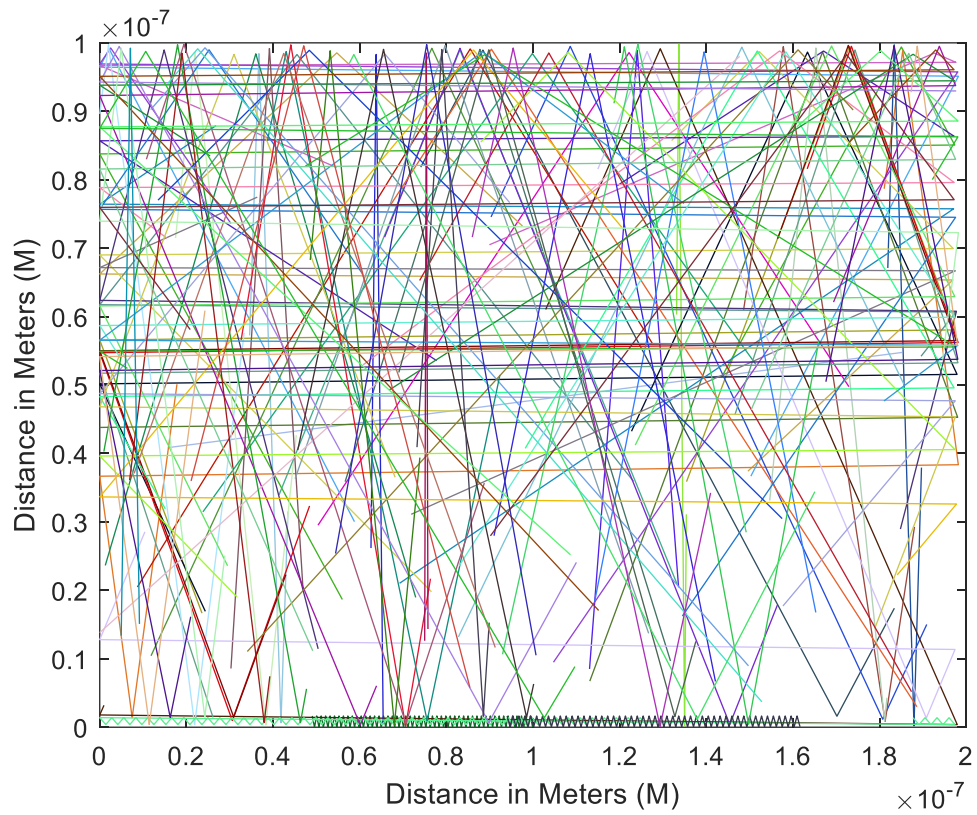


Figure 5: Plot of Electron Trajectories, Horizontal Lines Are A Result of The Electrons Going From X Boundary To X Boundary

Part 2: Collisions with Mean Free Path

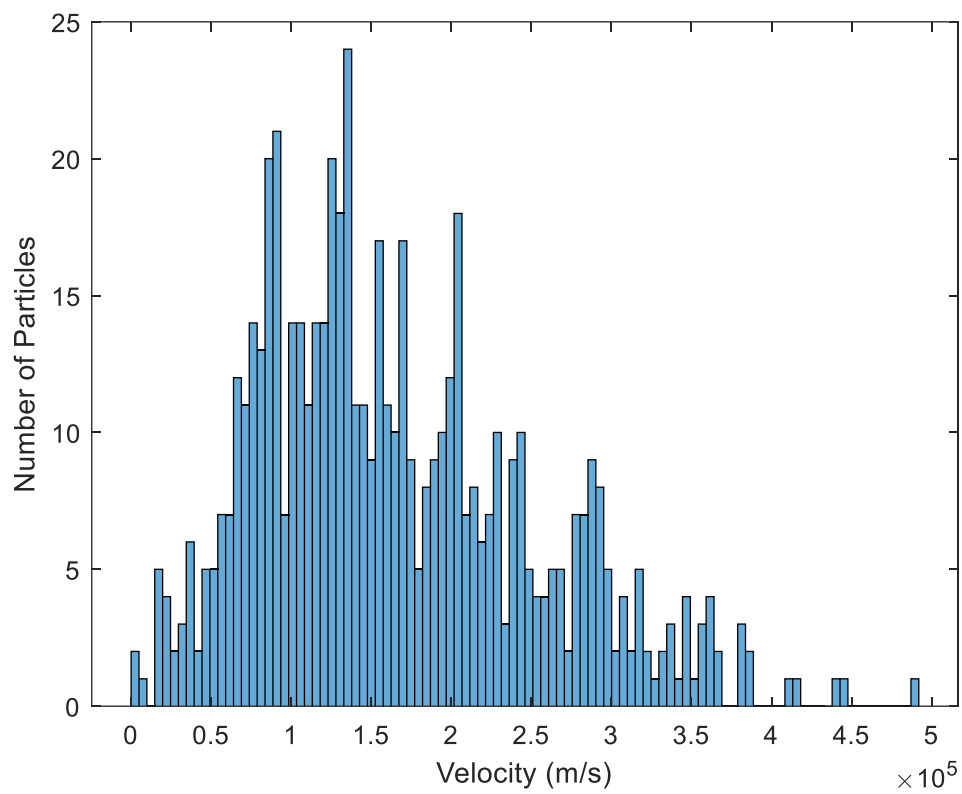


Figure 6: Histogram of Randomly Sampled Electron Velocities

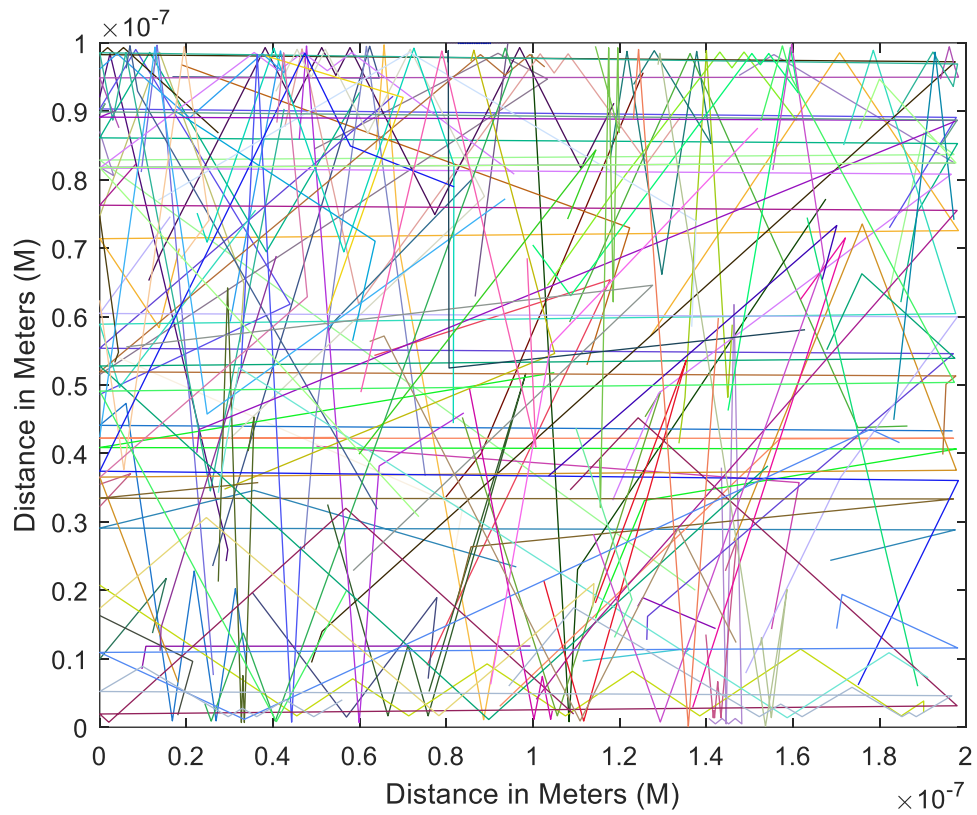


Figure 7: Trajectory plot of electrons with scattering

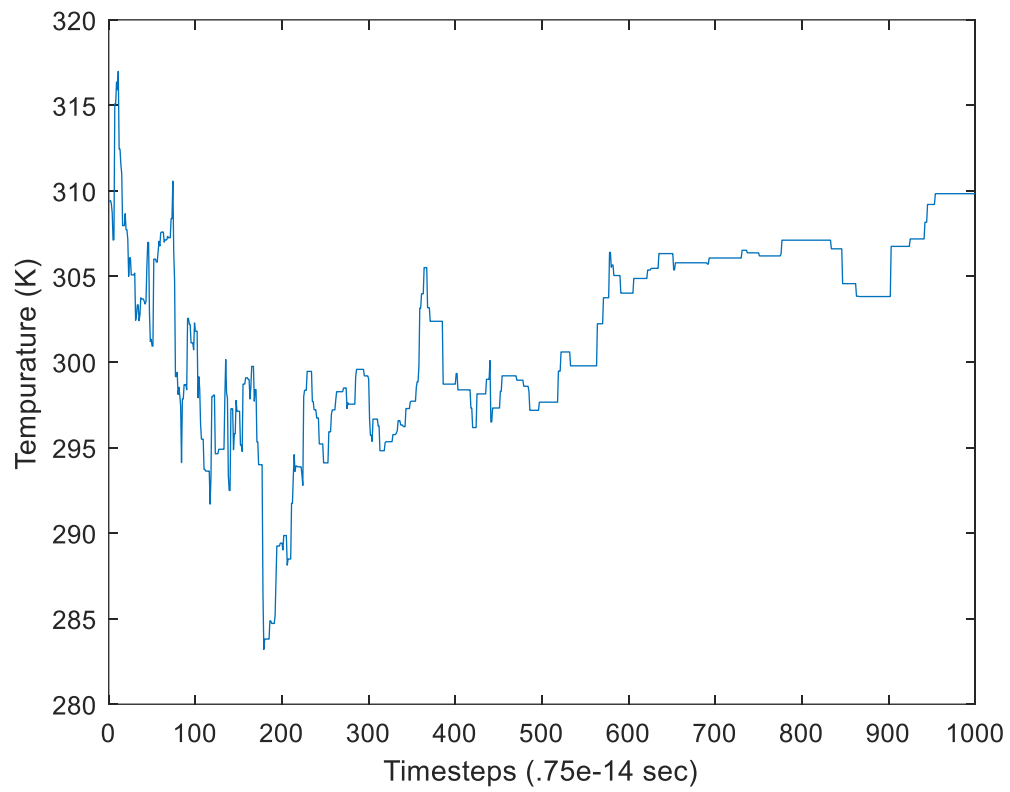


Figure 8: Average Temperature over time

The mean free path is : 2.487699×10^{-8} metres
The mean free time is : 1.535357×10^{-13} seconds

Figure 9: Mean Free Path and Mean Free Time Calculation Results

Part 3: Enhancements

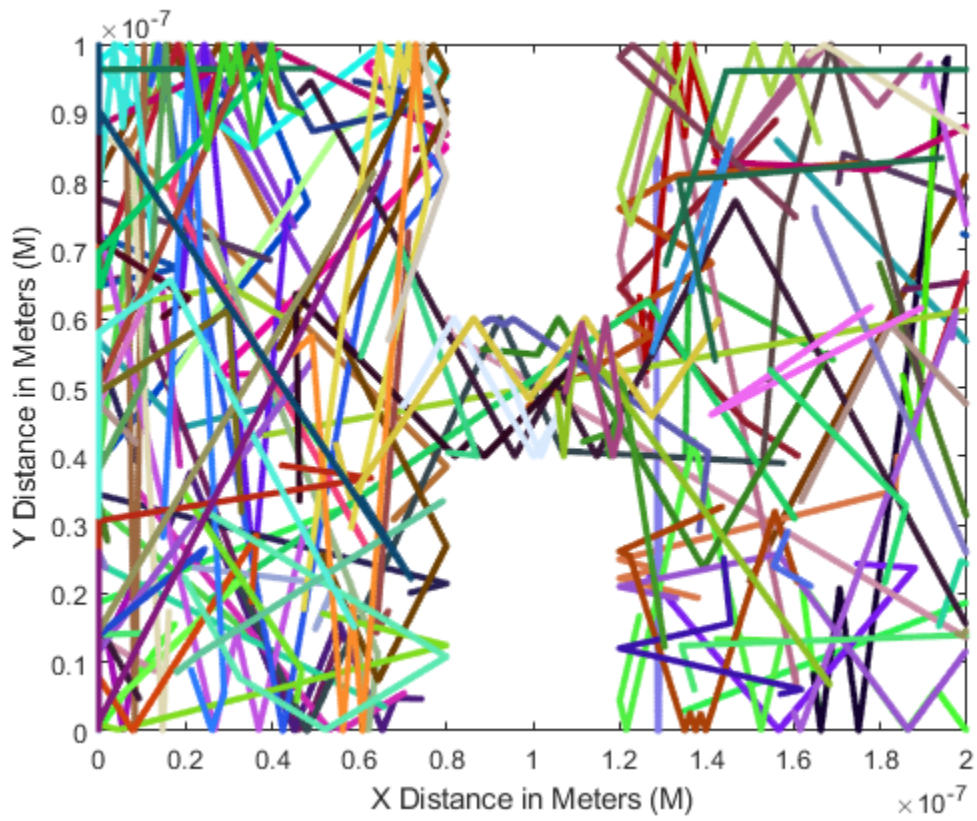


Figure 10: 100 Electron Trajectories with An Inserted Box

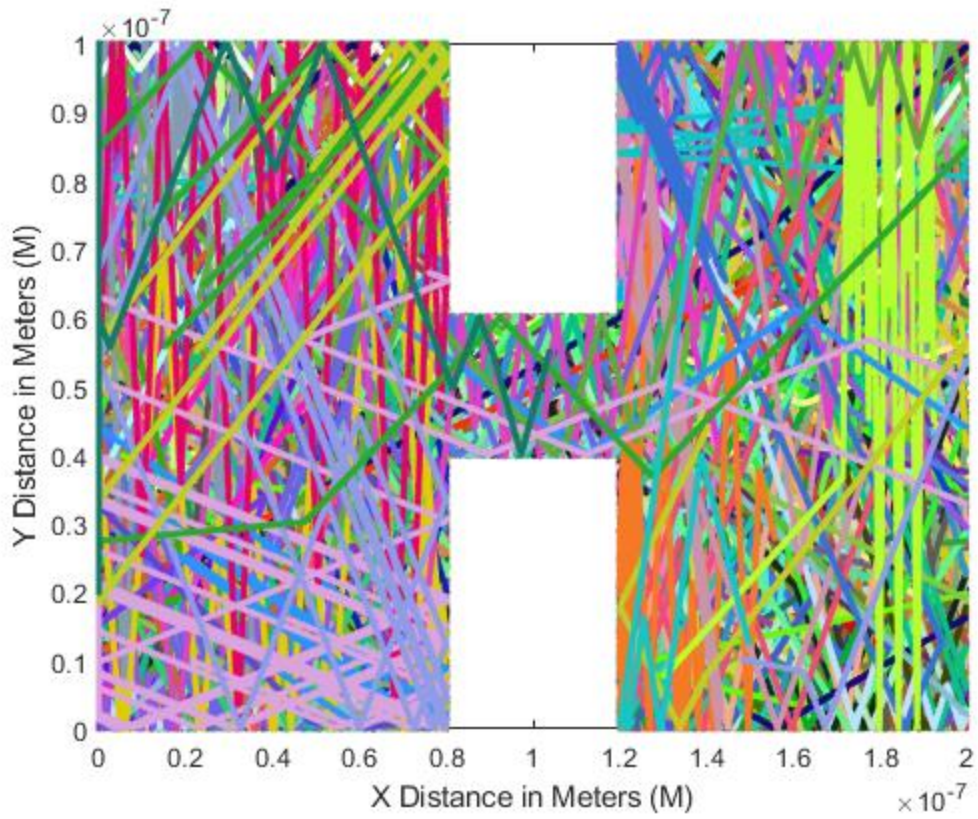


Figure 11: 1000 Electron Trajectories with An Inserted Box

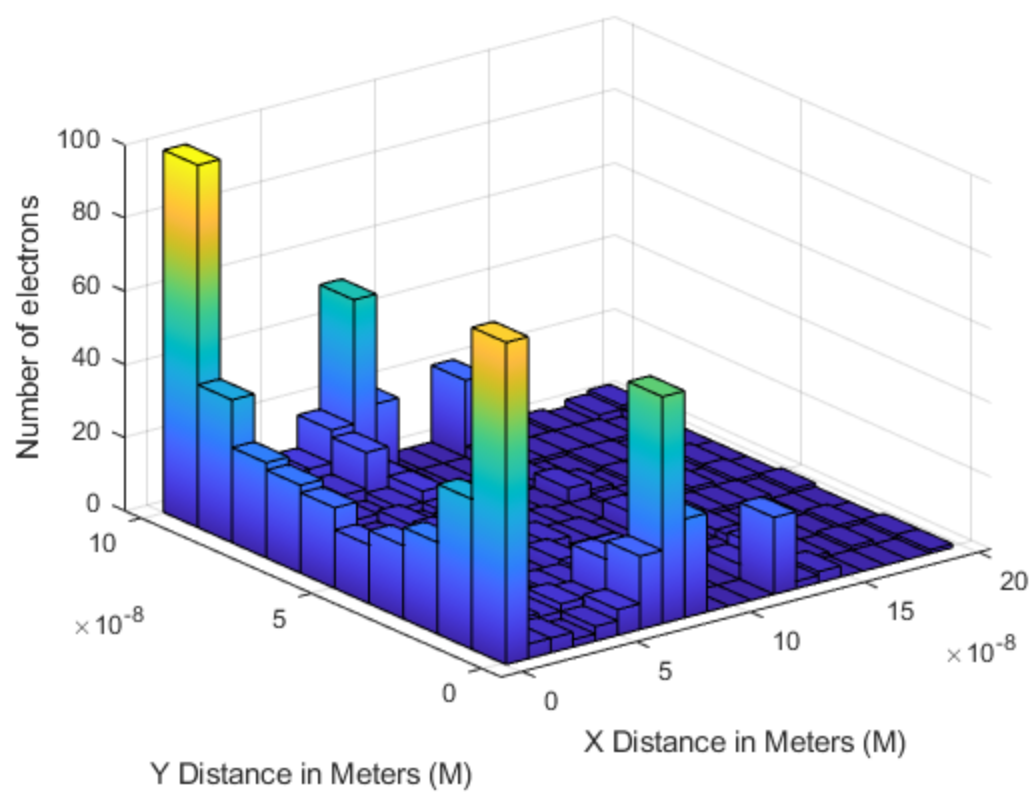


Figure 12: Density Map of Electrons

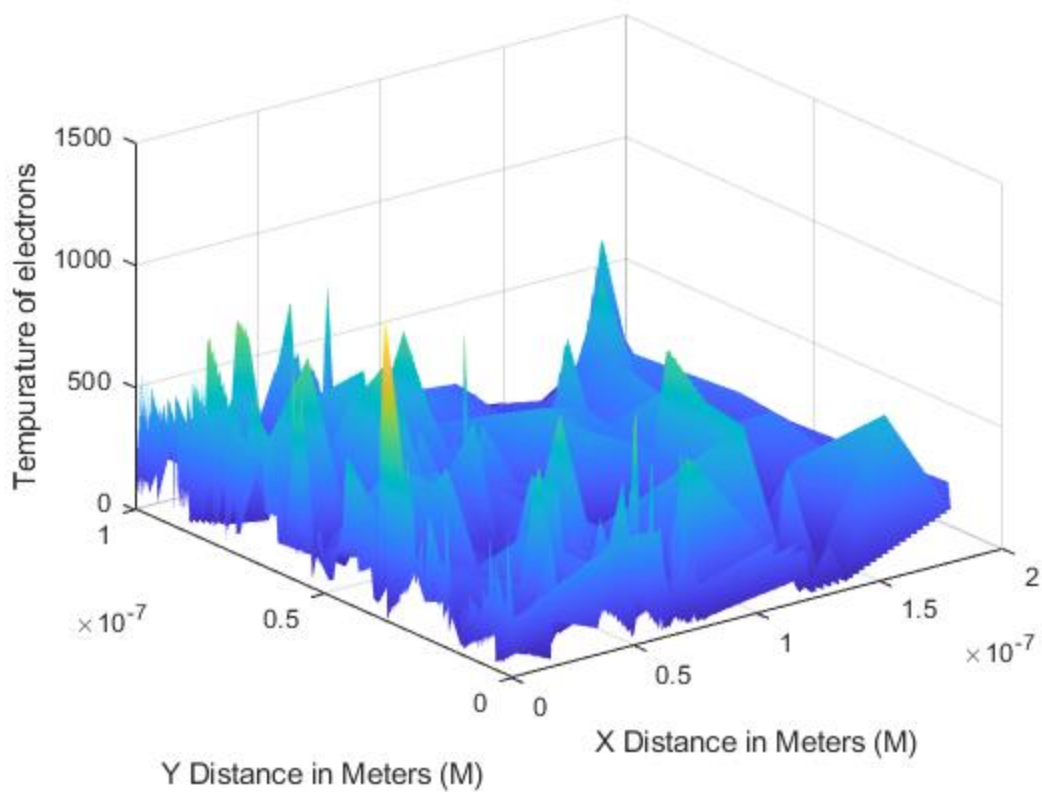


Figure 13: Temperature Map of Electrons