1 Coupled Heat and Mass Transfer

The following figures use the data from Miller et al. corresponding to Figure 2 in that paper. Figures 1 and 2 show the results for a forward Euler method and Figures 3 and 4 show the results for a fourth order Runge-Kutta method. For both methods a timestep of $0.01s$ was used and the final mass was limited to $0.000000001\ kg$.

Figures 5 and 6 shows the effect of increasing the timestep Δt.

(Apologies the figures are .png, I've tried out .eps and the figures take a while to load. Plotting data with Tikz is something I've used for reports in the past and I'll see if this works better).

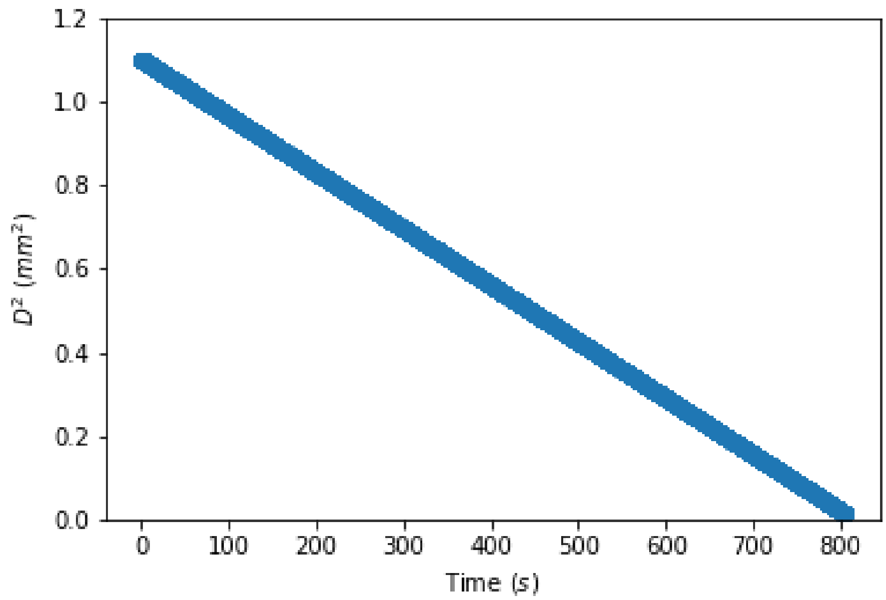

Figure 1: D^2 for a droplet sized $D^2 = 1.1mm$ with $Re_d = 0$, $T_{d_0} = 282K$, $T_G = 298K$, $Y_G = 0$ and $\Delta t = 0.01s$. Using a forward Euler method.

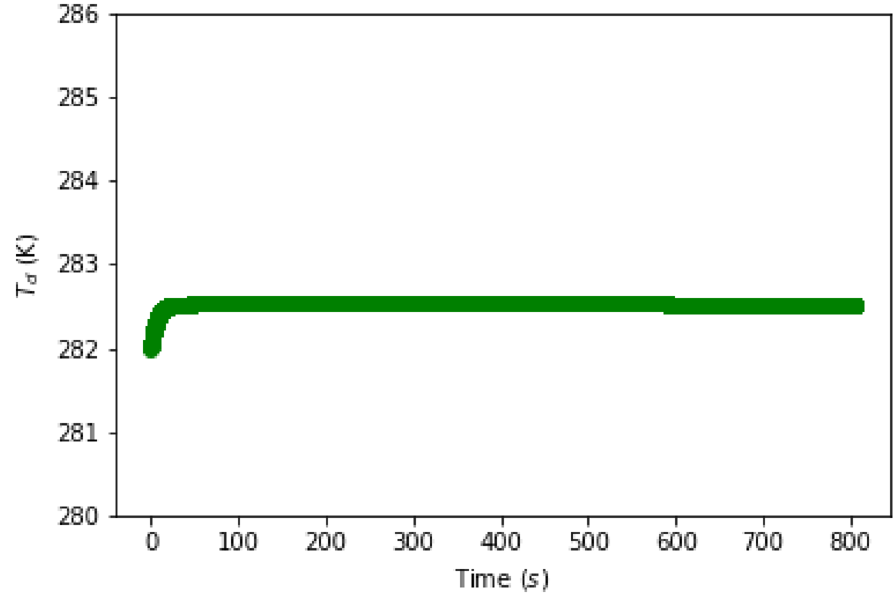

Figure 2: T_d for a droplet sized $D^2 = 1.1mm$ with $Re_d = 0$, $T_{d_0} = 282K$, $T_G = 298K$, $Y_G = 0$ and $\Delta t = 0.01s$. Using a forward Euler method.

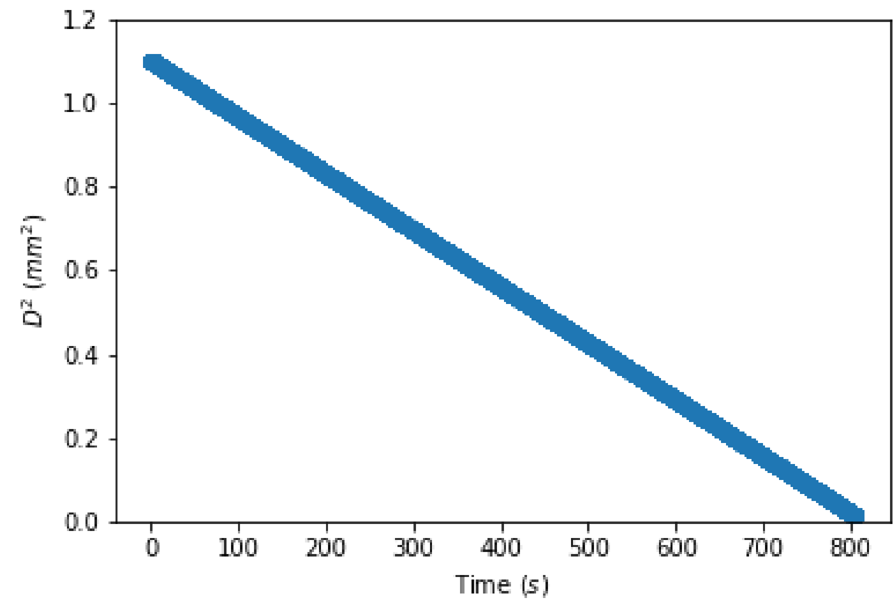

Figure 3: D^2 for a droplet sized $D^2 = 1.1mm$ with $Re_d = 0$, $T_{d_0} = 282K$, $T_G = 298K$, $Y_G = 0$ and $\Delta t = 0.01s$. Using a Runge-Kutta method.

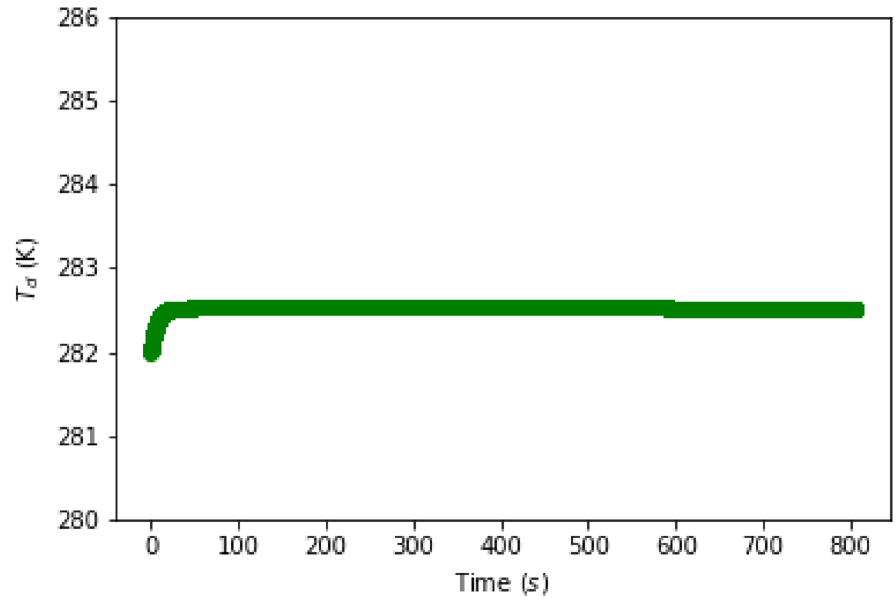

Figure 4: T_d for a droplet sized $D^2 = 1.1mm$ with $Re_d = 0$, $T_{d_0} = 282K$, $T_G = 298K$, $Y_G = 0$ for $\Delta t = 0.01s$. Using a Runge-Kutta method.

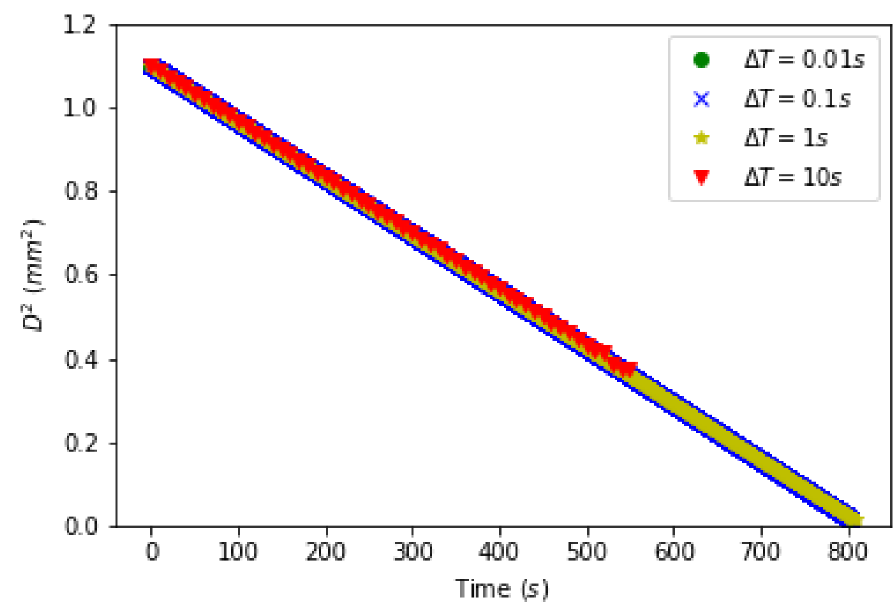

Figure 5: D^2 for a droplet sized $D^2 = 1.1mm$ with $Re_d = 0$, $T_{d_0} = 282K$, $T_G = 298K$, $Y_G = 0$ for different Δt. Using a Runge-Kutta method.

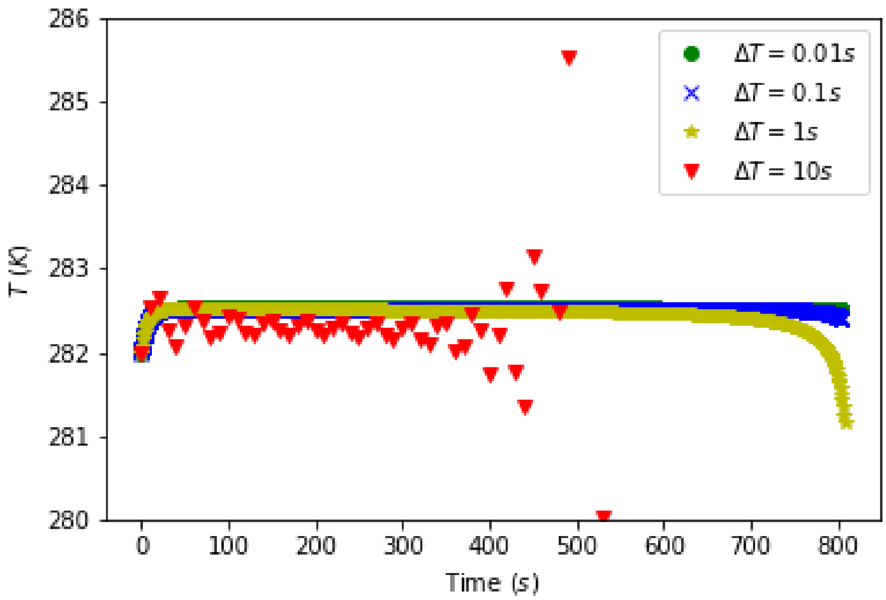

Figure 6: T_d for a droplet sized $D^2 = 1.1mm$ with $Re_d = 0$, $T_{d_0} = 282K$, $T_G = 298K$, $Y_G = 0$ and different Δt. Using a Runge-Kutta method.