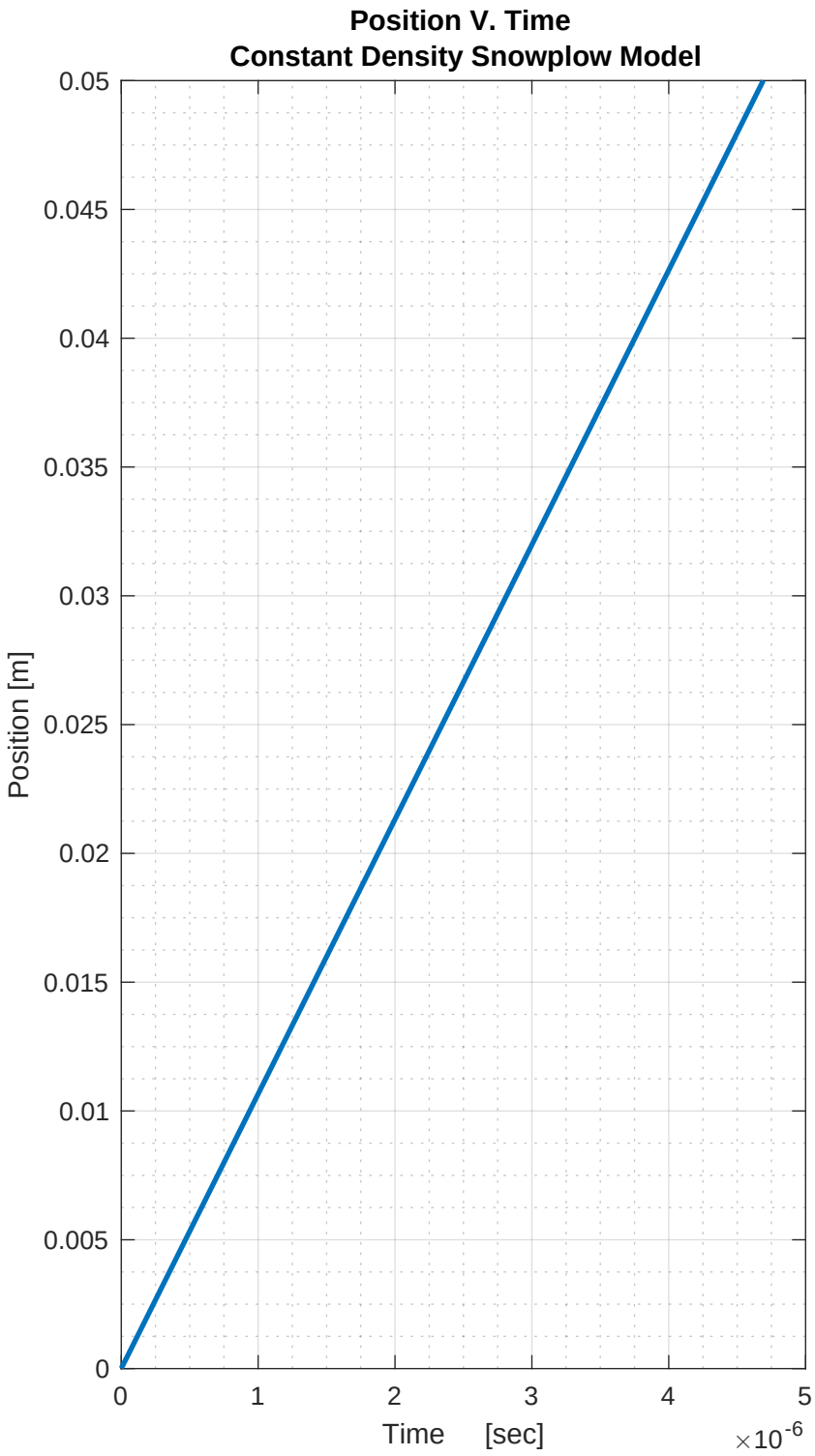
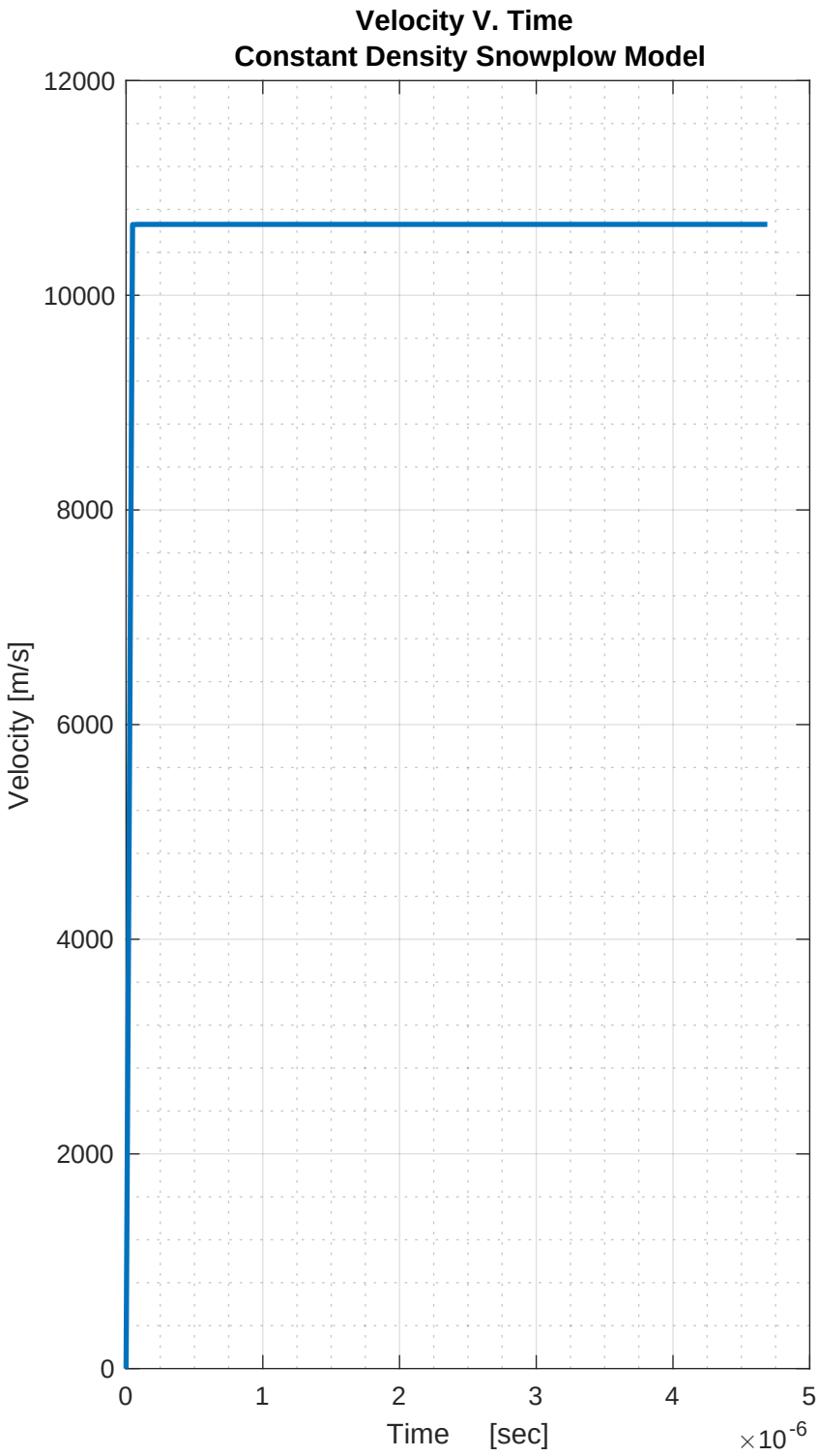
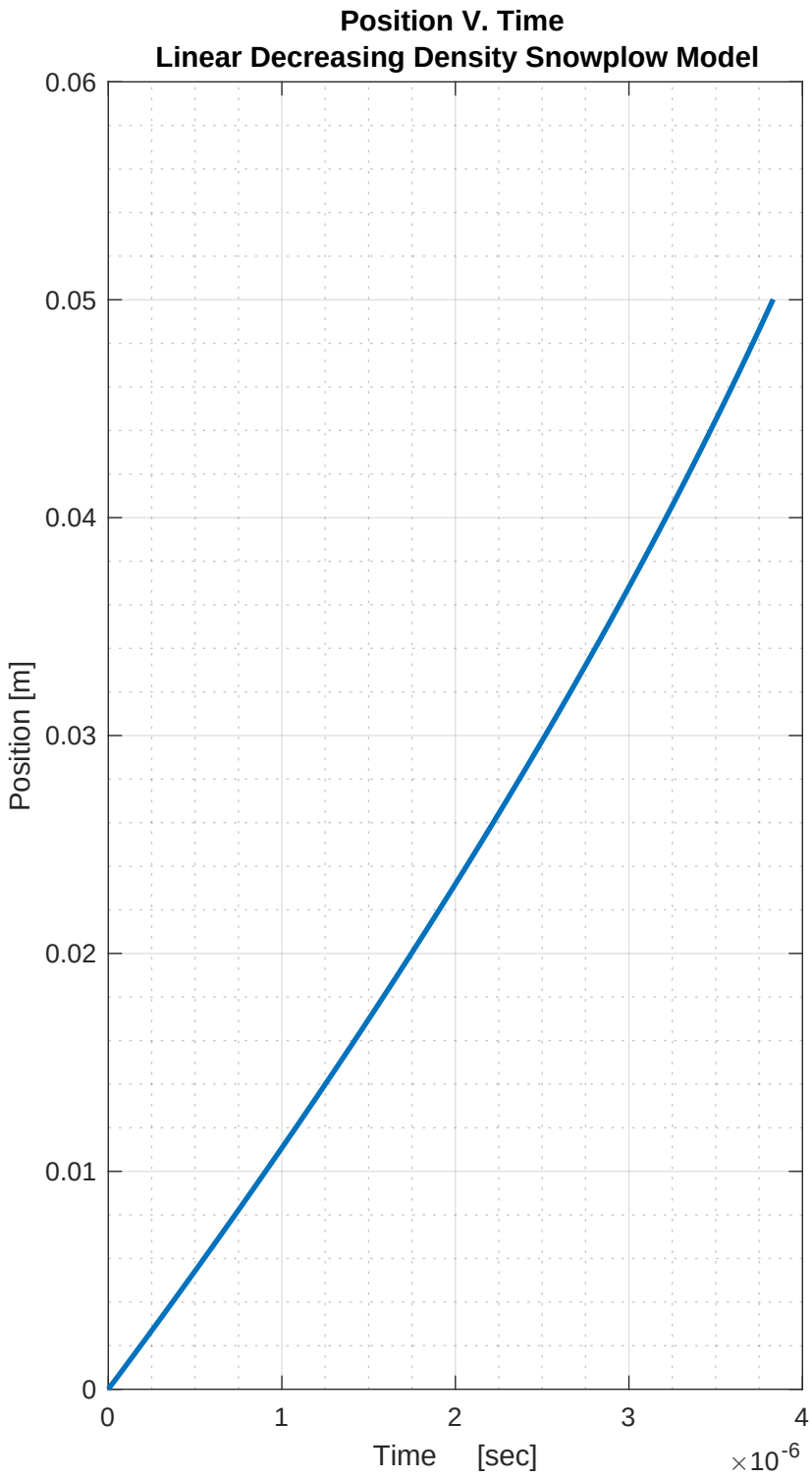
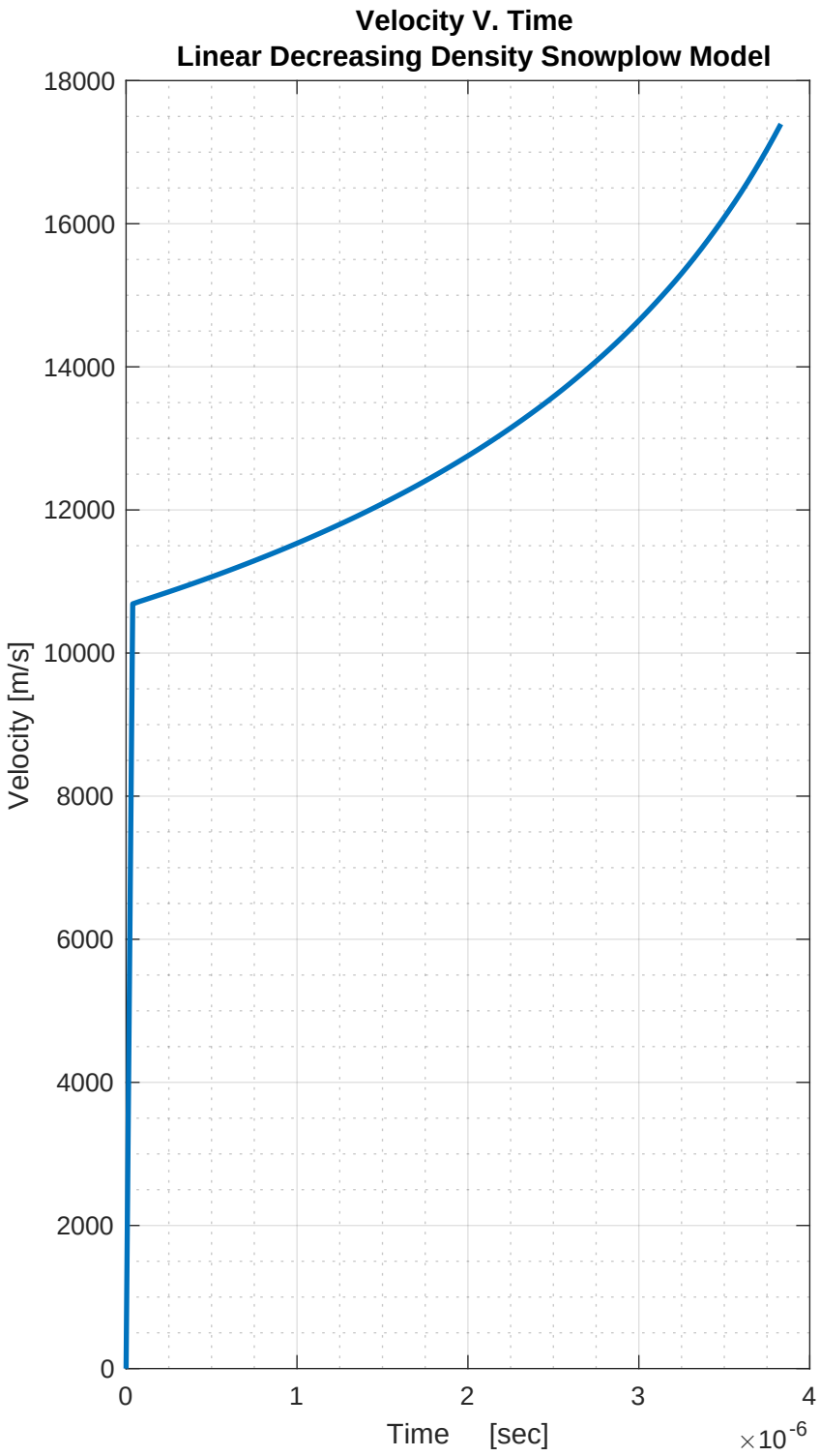
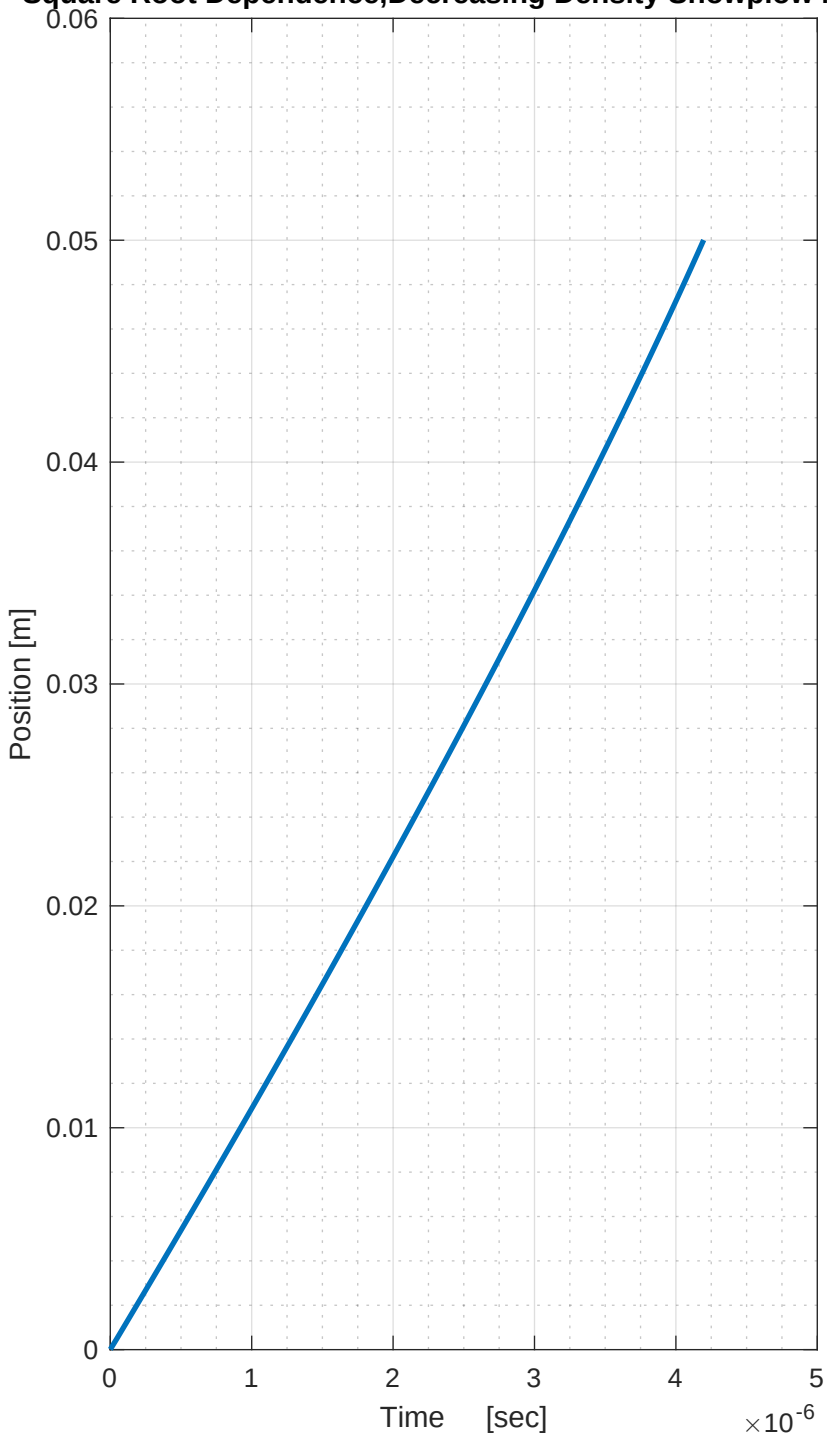
```
function hw7clean
    l = 0.05; % Channel Length [m]
    %Constant Density
    tMaxCD = 4.69e-6;
    tspan = linspace(0, tMaxCD,100);
    [tCD,xx] = ode23s(@snowplowi,tspan,[0.00001,0]);
    xCD = xx(:,1);
    xdotCD = xx(:,2);

    %Linearly Decreasing Density
    tMaxLDD = 3.8311e-6;
    tspan = linspace(0, tMaxLDD, 100);
    [tLDD,xx] = ode23s(@snowplowii,tspan,[0.00001,0]);
    xLDD = xx(:,1);
    xdotLDD = xx(:,2);

    %Square Root Dependence,Decreasing Density
    tMaxSQD = 4.19633e-6;
    tspan = linspace(0, tMaxSQD,100);
    [tSQD,xx] = ode23s(@snowplowiii,tspan,[0.00001;0]);
    xSQD = xx(:,1);
    xdotSQD = xx(:,2);

    %Note: Plotting code removed for space
end

function xdot = snowplowi(t,x)
    l = 0.05; area = 0.03*0.03; R_A = 208.13; P_o = 66.661185; T_o = 273; rho = P_o / (R_A *
        T_o);J = 20e3; Lprime = 0.6E-6; F = 0.5*Lprime*J^2;
    m = area*rho*x(1);
    mdot = area*rho*x(2);
    xdot = [x(2); (F-(mdot*x(2)))/m];
end

function xdot = snowplowii(t,x)
    l = 0.05; area = 0.03*0.03; R_A = 208.13; P_o = 66.661185; T_o = 273; rho = P_o / (R_A *
        T_o);J = 20e3; Lprime = 0.6E-6; F = 0.5*Lprime*J^2;
    m = area*rho*(x(1)-(((x(1))^2)/(2*l)));
    mdot = area*rho*x(2)*(1-(x(1)/l));
    xddot = F\[mdot m]
    xdot = [x(2); (F-(mdot*x(2)))/m]
end

function xdot = snowplowiii(t,x)
    l = 0.05; area = 0.03*0.03; R_A = 208.13; P_o = 66.661185; T_o = 273; rho = P_o / (R_A *
        T_o);J = 20e3; Lprime = 0.6E-6; F = 0.5*Lprime*J^2;
    m = area*rho*(-(2/3)*(l - x(1))*sqrt(1 - x(1)/l)+((2/3)*l));
    mdot = area*rho*sqrt(1-(x(1)/l))*x(2);
    xdot = [x(2); (F-(mdot*x(2)))/m];
end
```

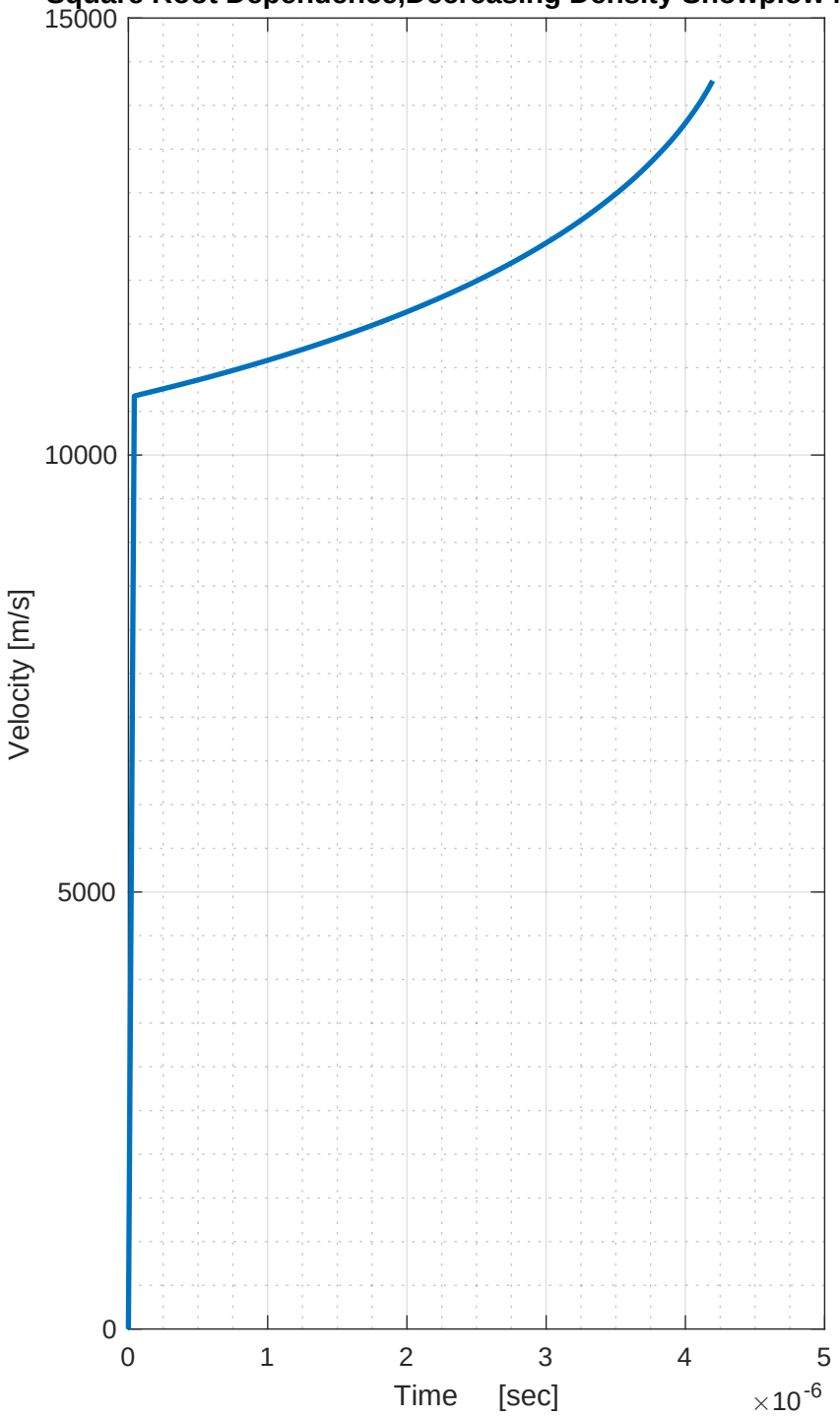

Position V. Time
Constant Density Snowplow Model
Position [m]
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
1
2
3
4
5
Time [sec]
×10-6

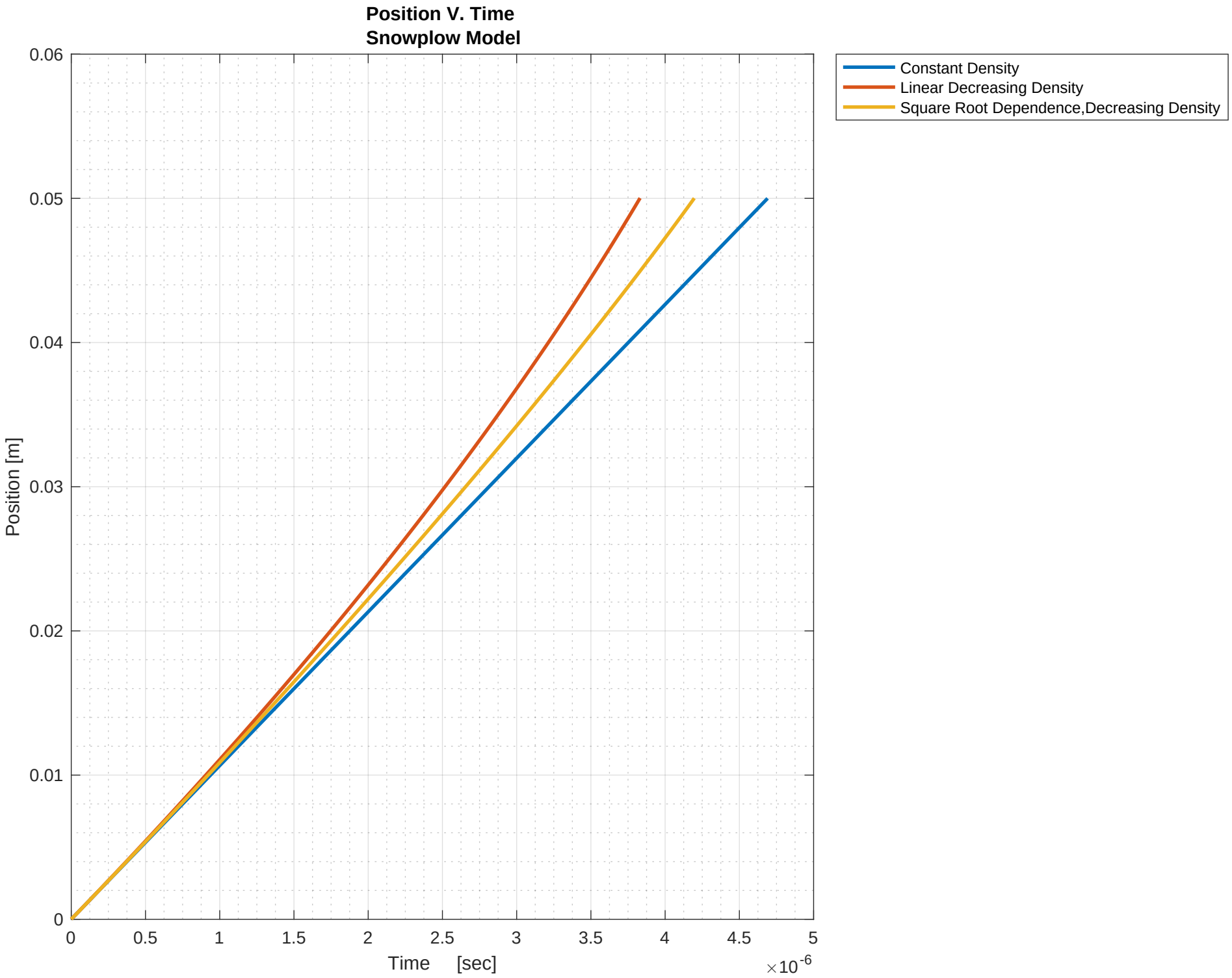

Velocity V. Time
Constant Density Snowplow Model
Velocity [m/s]
12000
10000
8000
6000
4000
2000
0
0
1
2
3
4
5
Time [sec]
×10-6

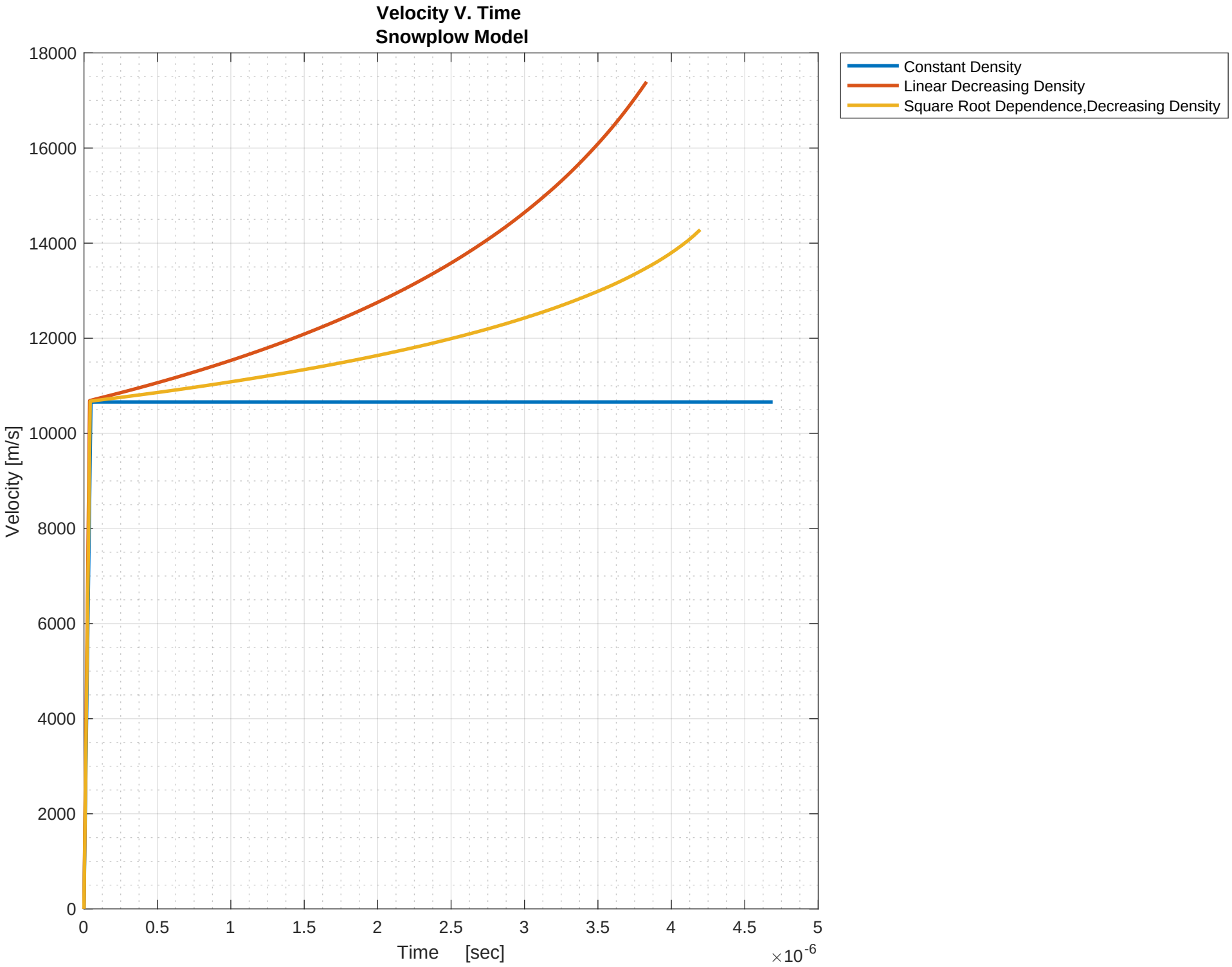

Position V. Time
Linear Decreasing Density Snowplow Model
Position [m]
0
0.01
0.02
0.03
0.04
0.05
0.06
0
1
2
3
4
Time [sec]
×10-6


Velocity V. Time
Linear Decreasing Density Snowplow Model
Velocity [m/s]
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
0
1
2
3
4
Time [sec]
×10-6


Position V. Time
Square Root Dependence,Decreasing Density Snowplow Model
Position [m]
0.06
0.05
0.04
0.03
0.02
0.01
0
0
1
2
3
4
5
Time [sec]
×10-6


Velocity V. Time
Square Root Dependence,Decreasing Density Snowplow Model
Velocity [m/s]
15000
10000
5000
0
0
1
2
3
4
5
Time [sec]
×10-6


Position V. Time
Snowplow Model
Constant Density
Linear Decreasing Density
Square Root Dependence,Decreasing Density
Position [m]
0
0.01
0.02
0.03
0.04
0.05
0.06
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Time [sec]
×10-6


Velocity V. Time
Snowplow Model
Constant Density
Linear Decreasing Density
Square Root Dependence,Decreasing Density
Velocity [m/s]
Time [sec]
×10^-6
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5