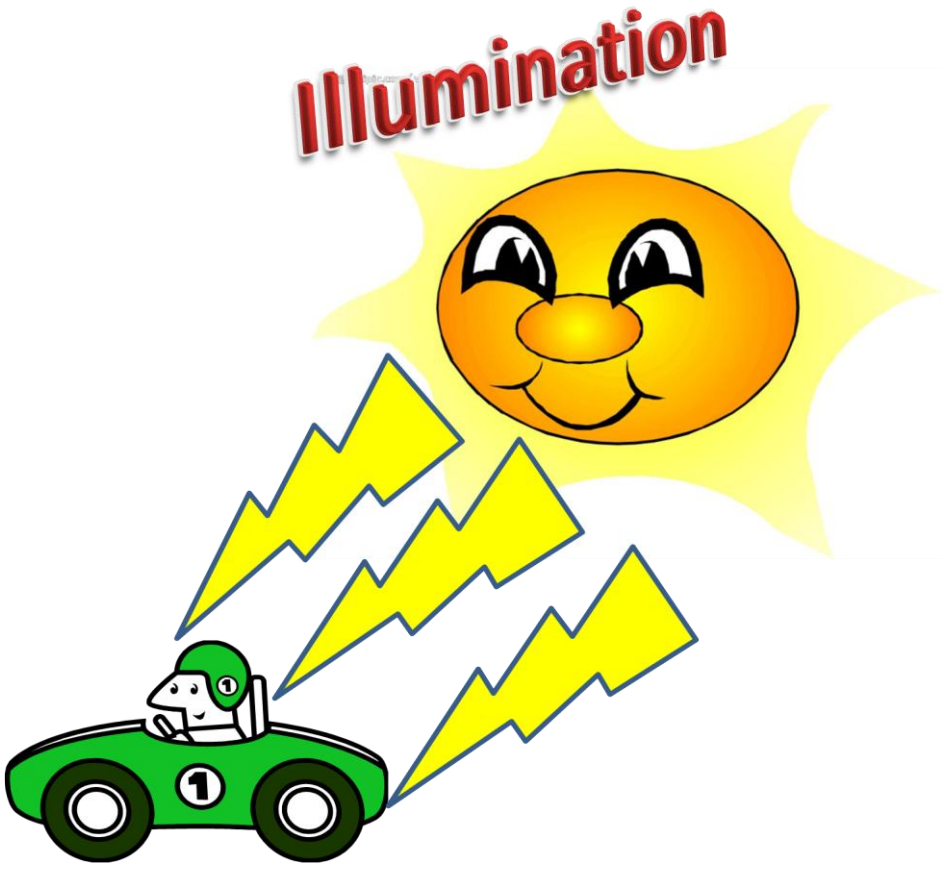
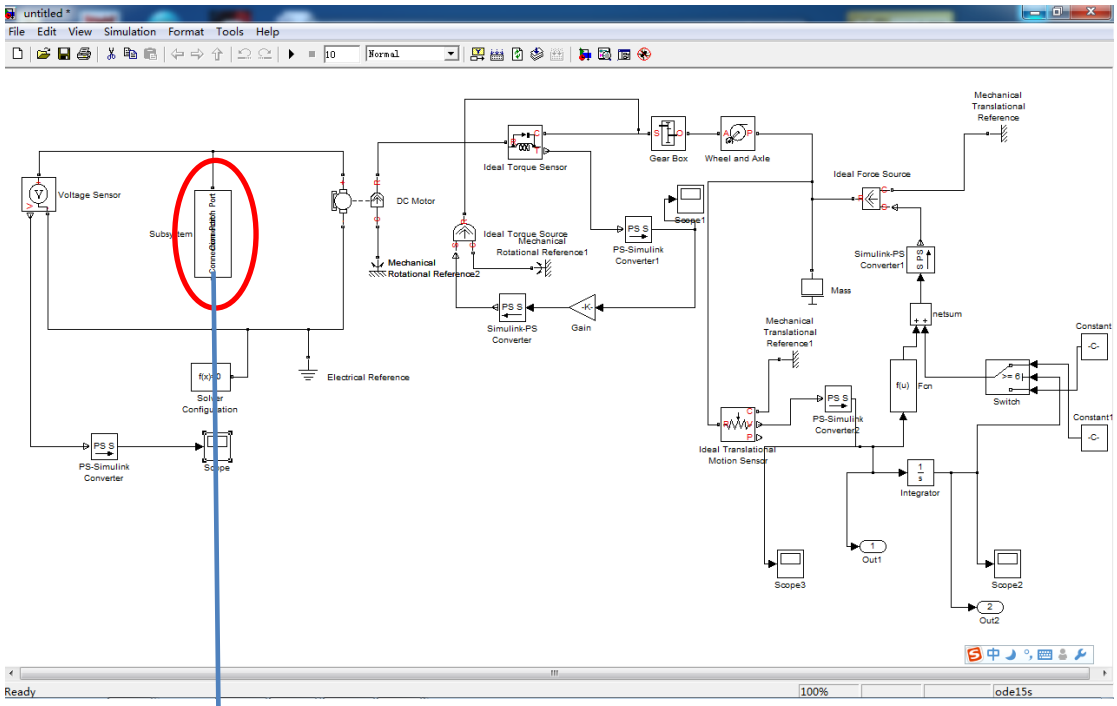
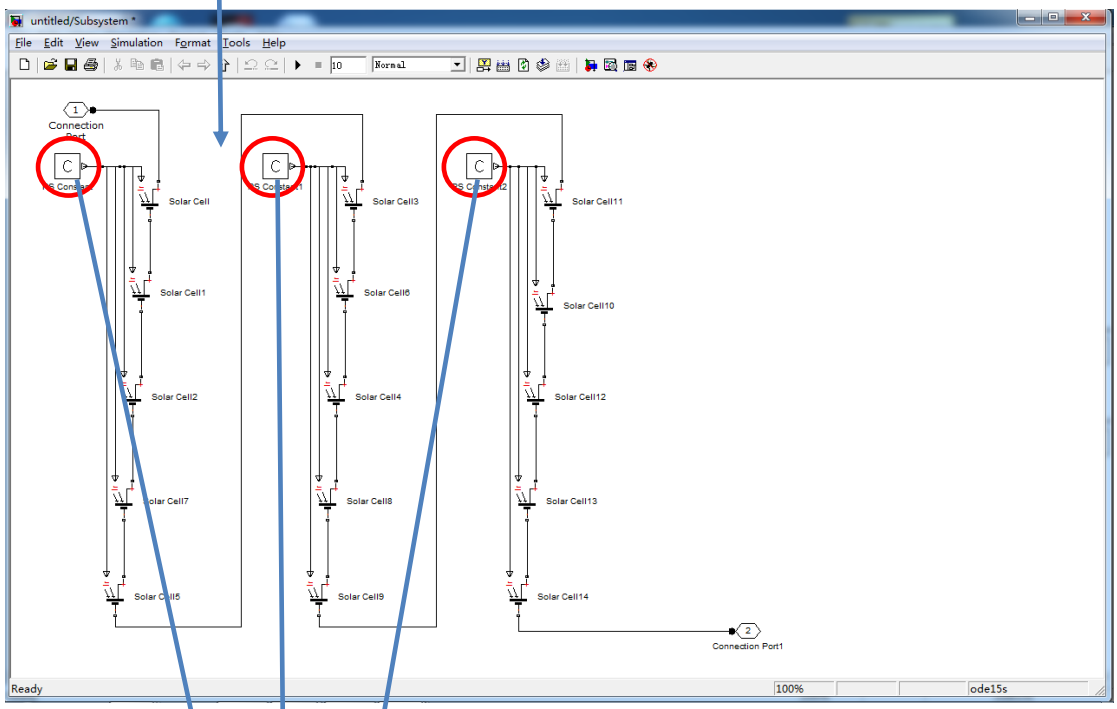
Simulink report

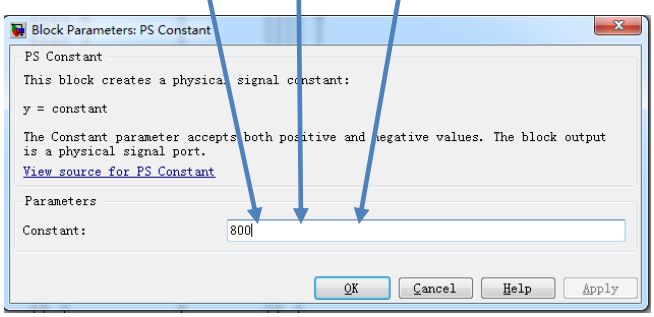


Part 1-Simulink1



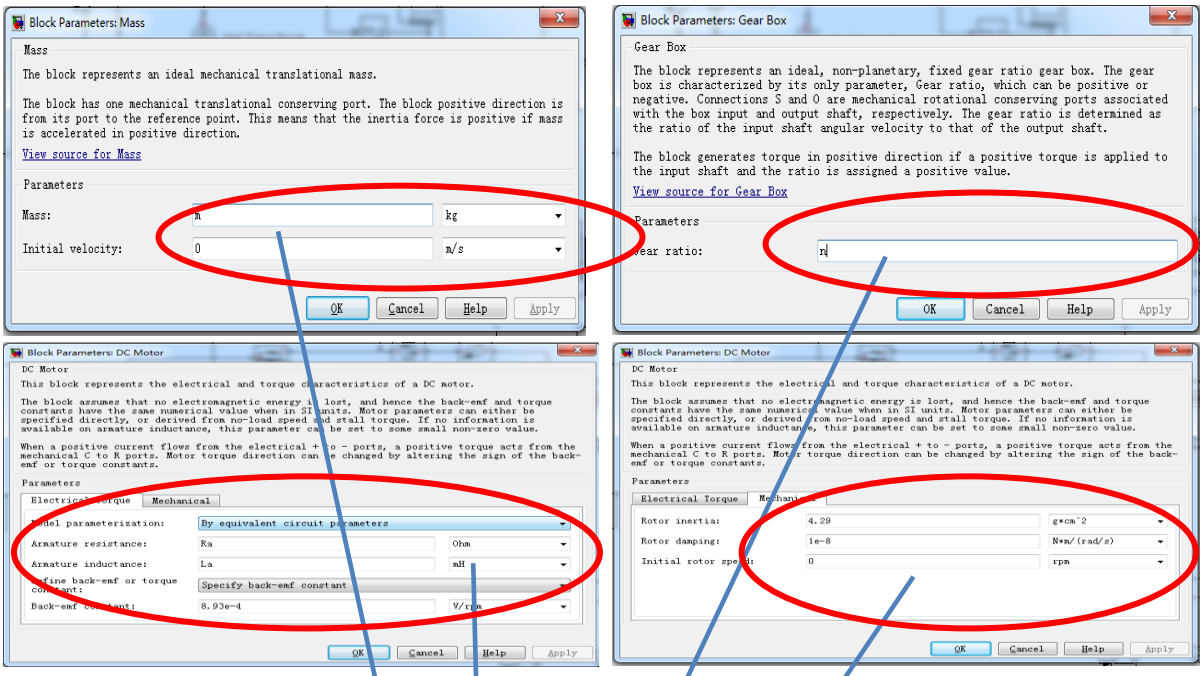
We build a system which is made up of 15 solar cells.

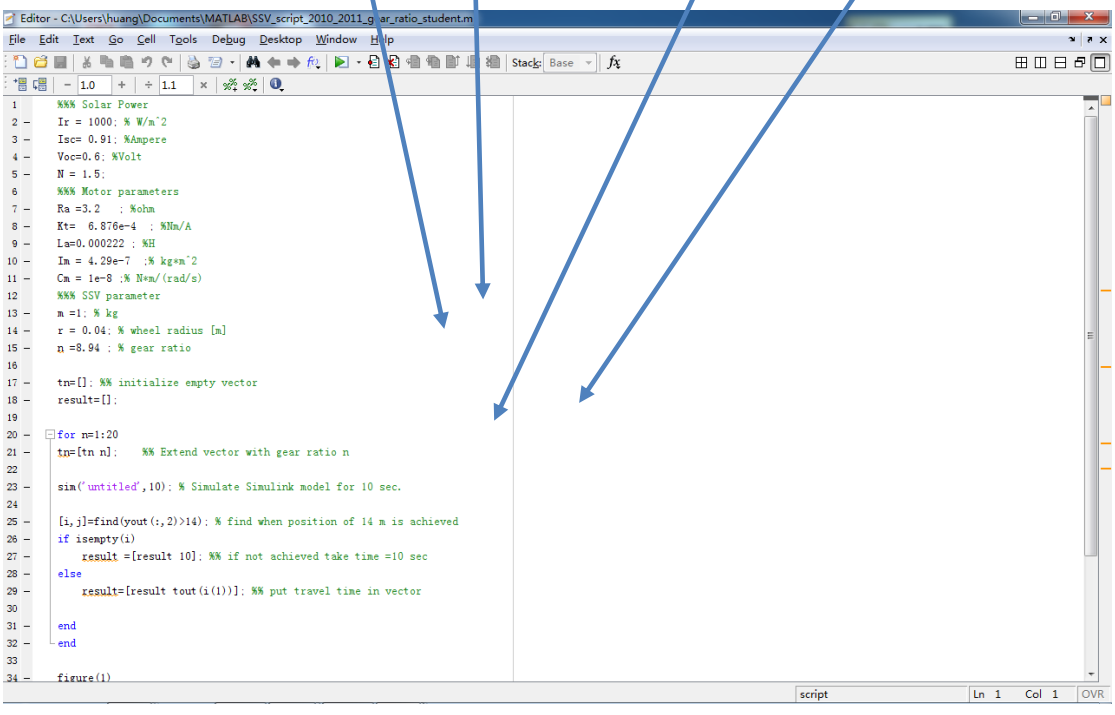


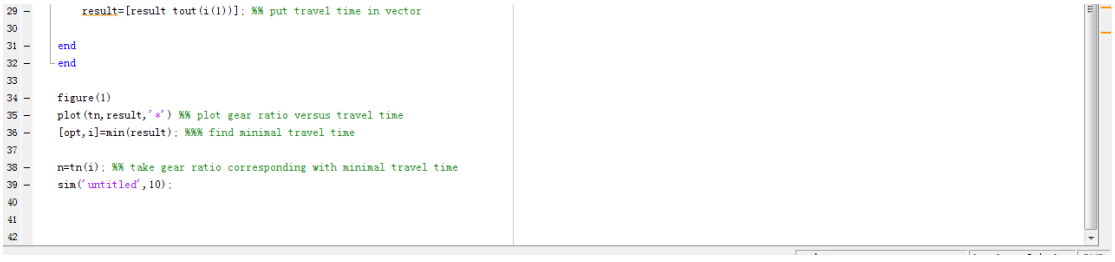


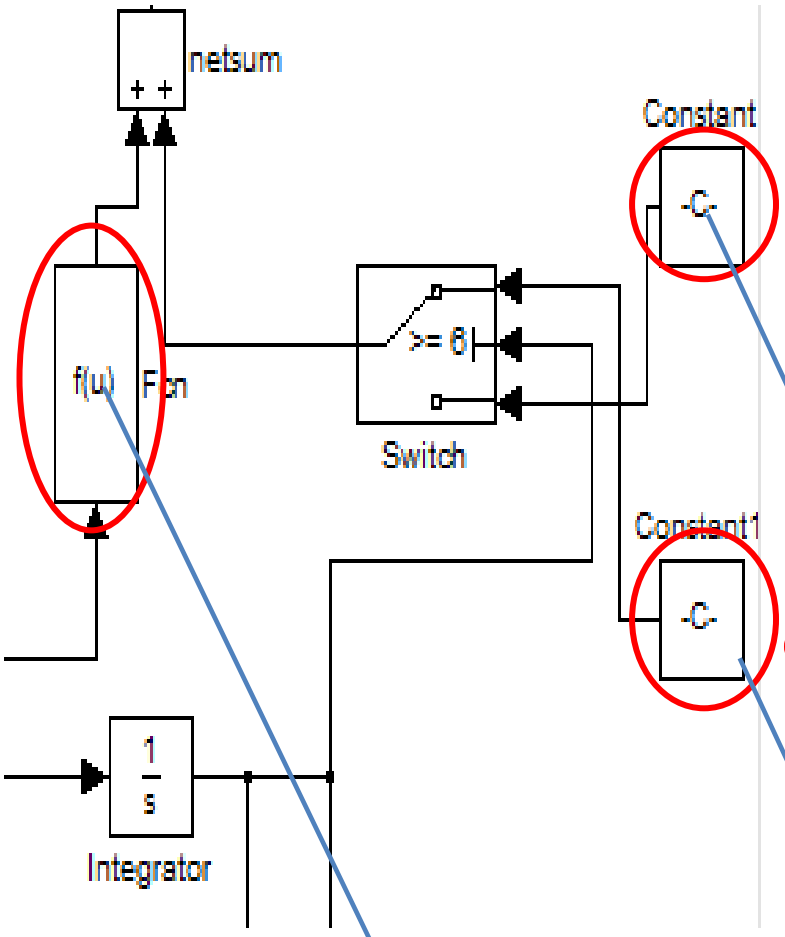
Every solar cell is given by a constant number 800.

Most parameters are given by script.

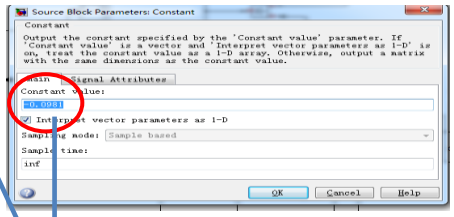




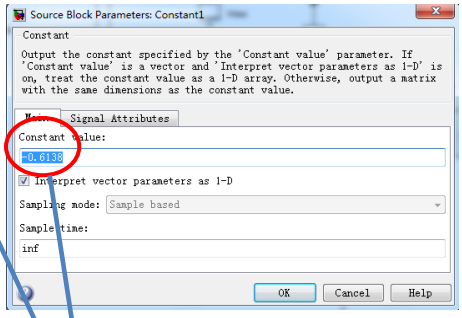




We build a switch which is given two constant. When displacement is smaller than 6, the system will work with the constant above. Otherwise the system will work with the one below.



what displayed is:
-Crr*m*g=-0.981



What dispalyed is:
-Crr*m*g*cosθ -m*g*sinθ =-0.6138

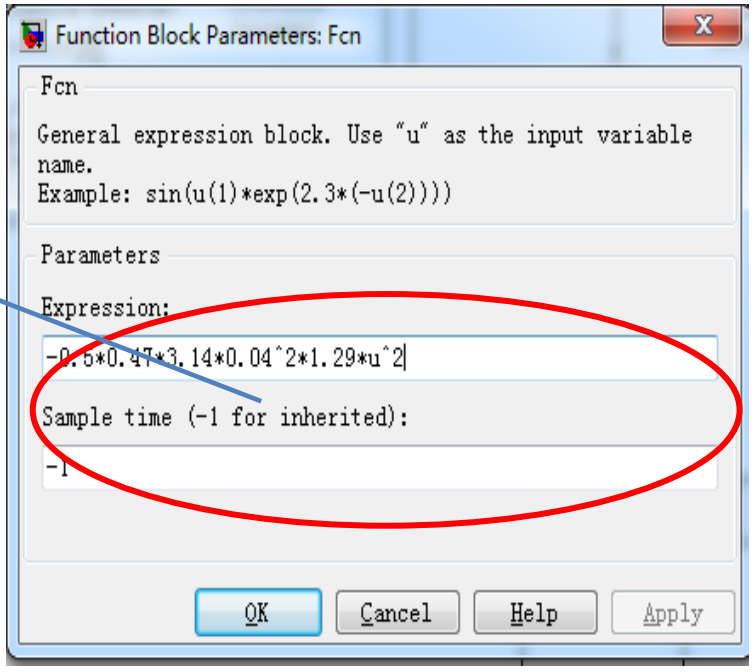
We also build a function to give a air resistance to the car.

Air resistance (no wind):

$F_w = \frac{1}{2} \cdot C_w \cdot A \cdot \rho \cdot v^2$

Cw=0.47,

A=π*r^2,ρ=1.29kg/m^3,

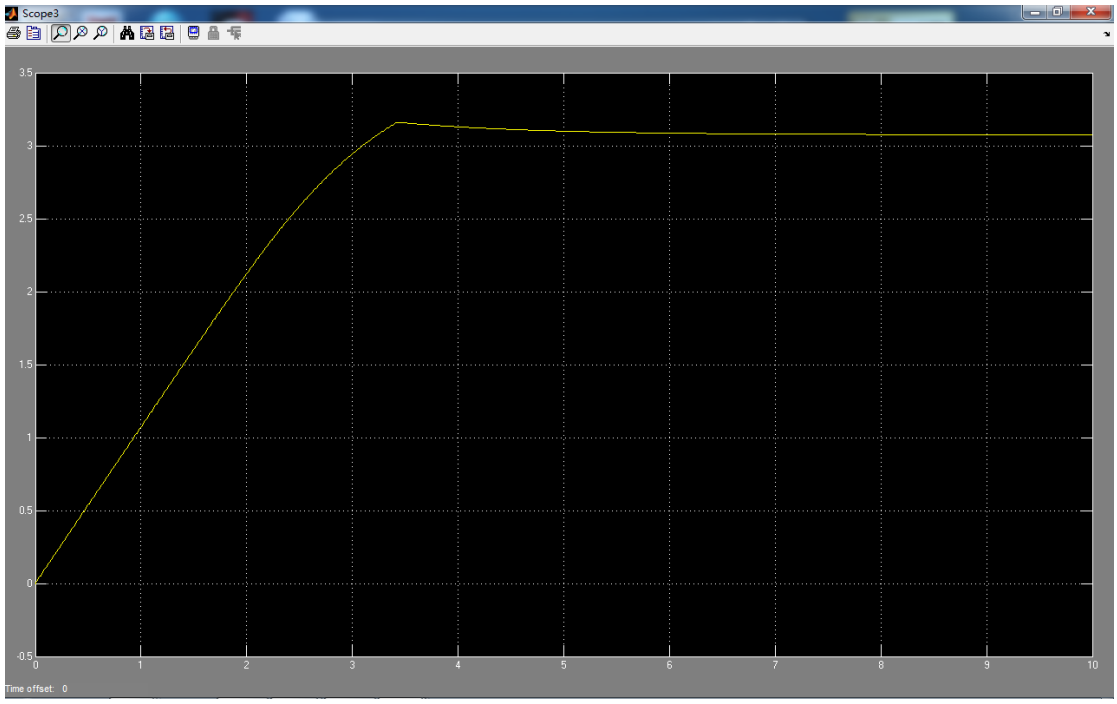


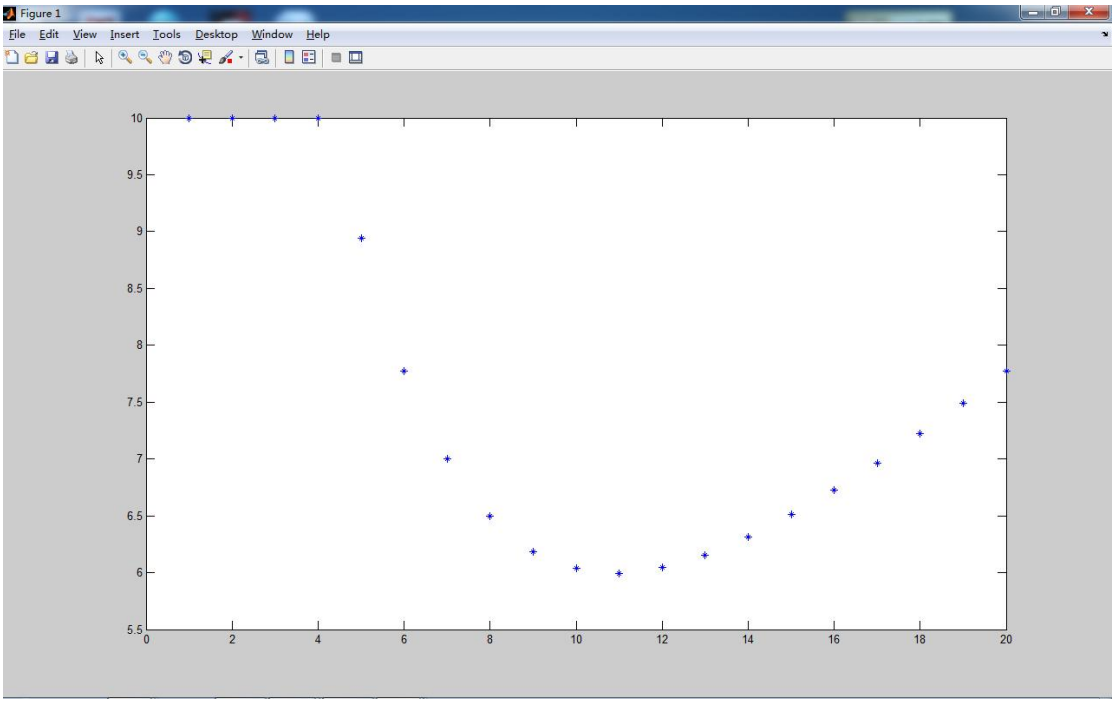
The result

Displacement:

From this diagram,we can see that when the dispalcement is 14meters. The time is nearly 5.8 secons.

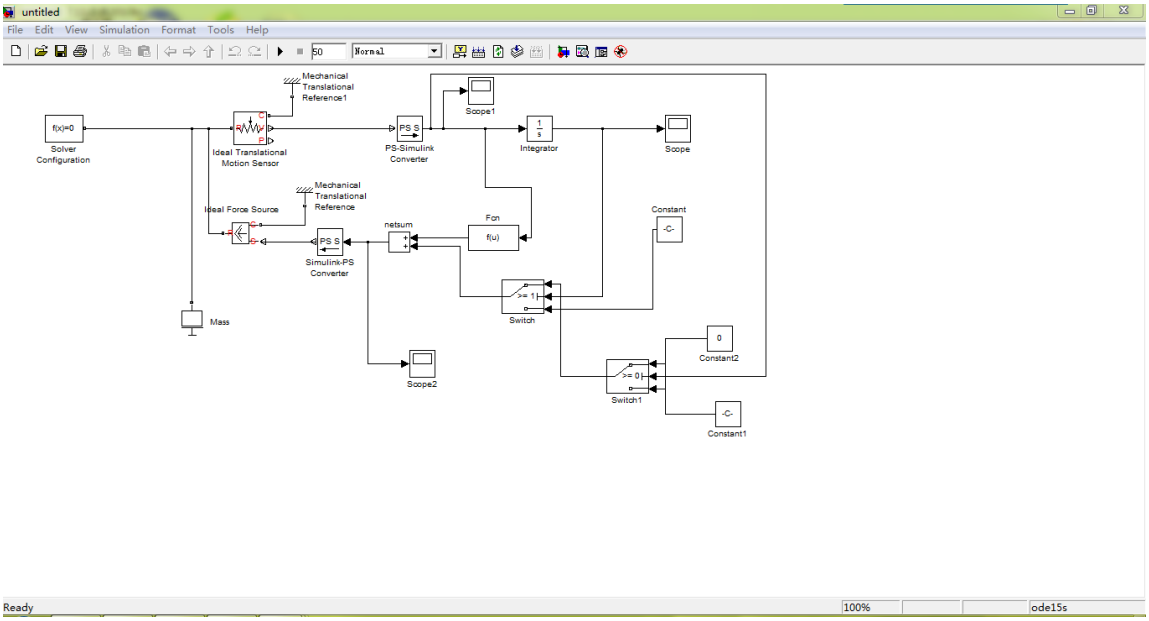
Velocity:





Through this , we can see that the time is the smallest when the gear ratio is 11.
So after that we will select this gear ratio, when we made the gear box.

Part 2-simulink 2



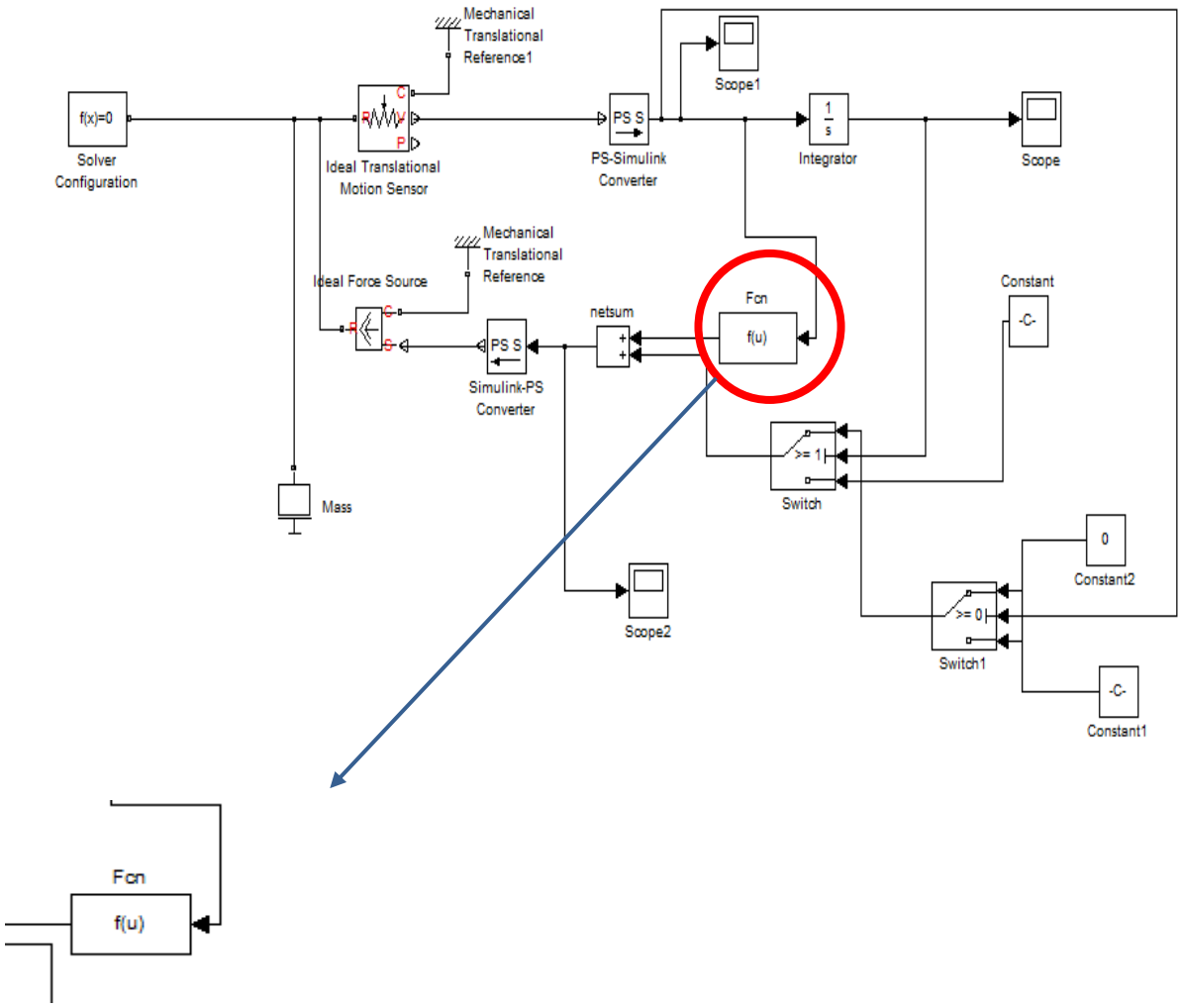
simulink2--structure i

This is the structure of our simulink 2 which is to measure the distance when we make the SSV go from 1 meter up the ramp used in the race, which is the distance not the height, without any propulsion, motor and

solar panel.

Now we will explain our design.

1. Air resistance

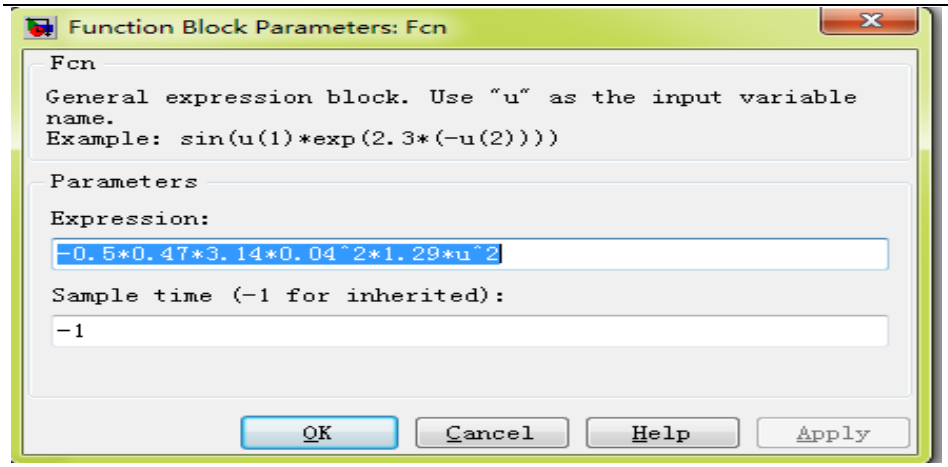


F_{cn} is the resistance which comes from air.

Air resistance (no wind):

$$F_w = \tfrac{1}{2} \cdot C_w \cdot A \cdot \rho \cdot v^2$$

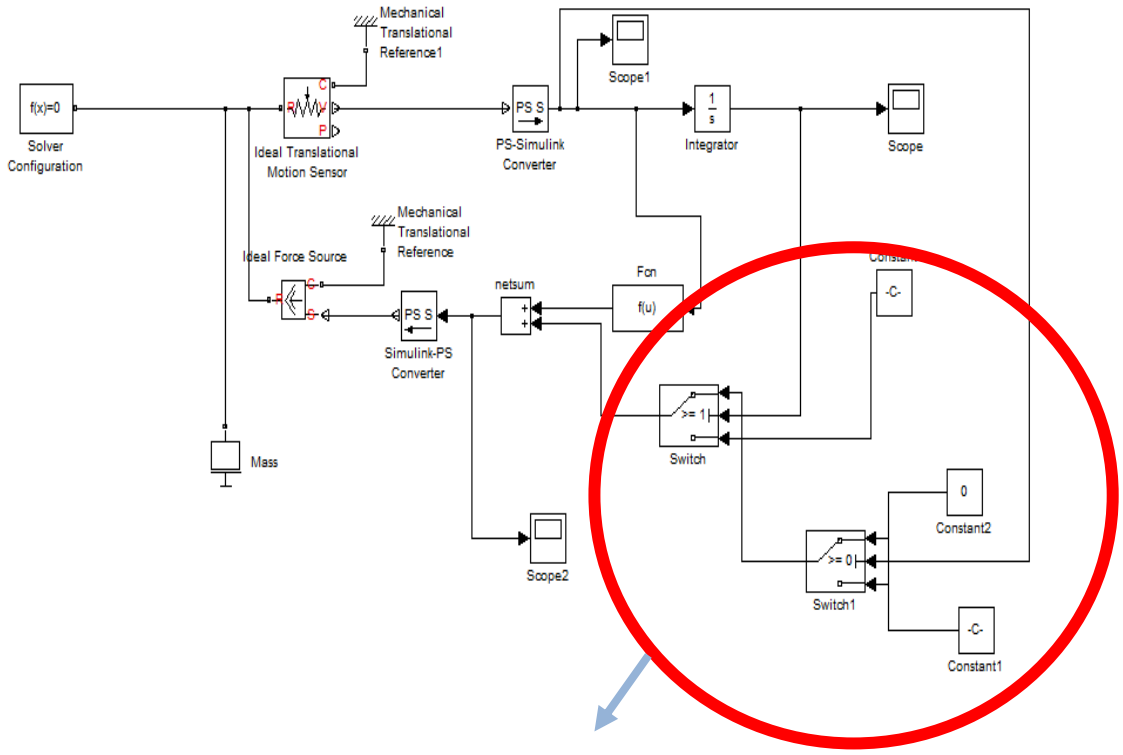
This is the function to calculate the air resistance.

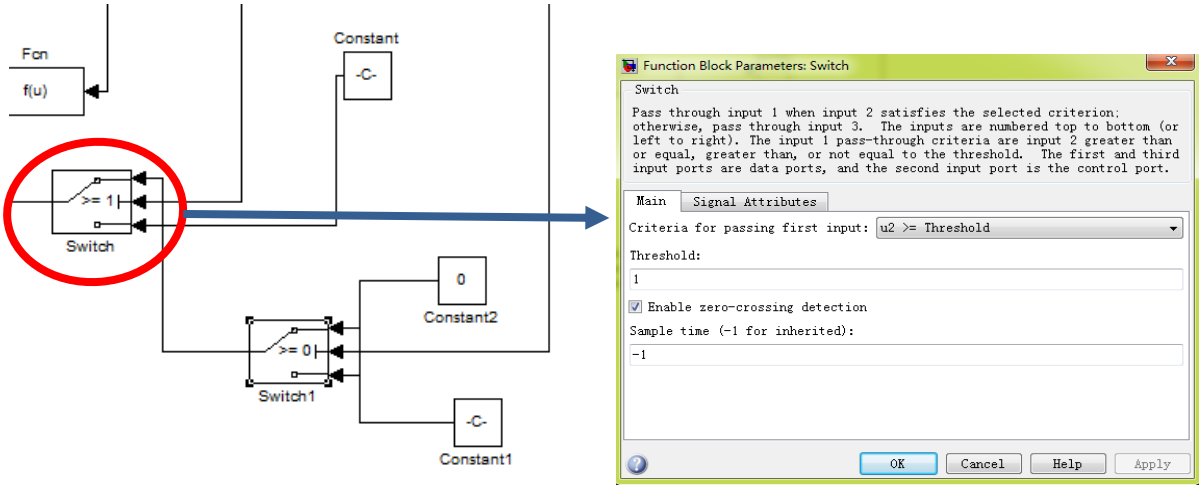


In our function of F_{cn},

C_w=0.47; A=3.14*0.04^2; ρ =1.29

2. Ramp

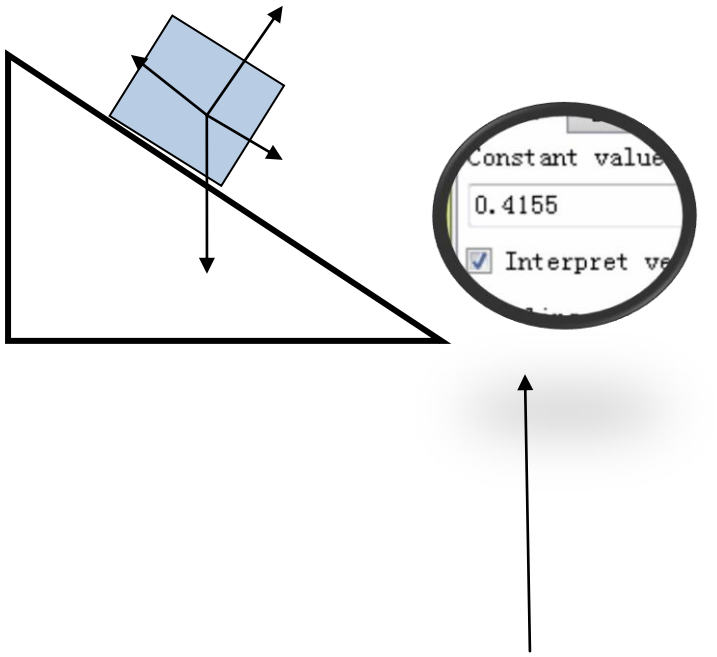


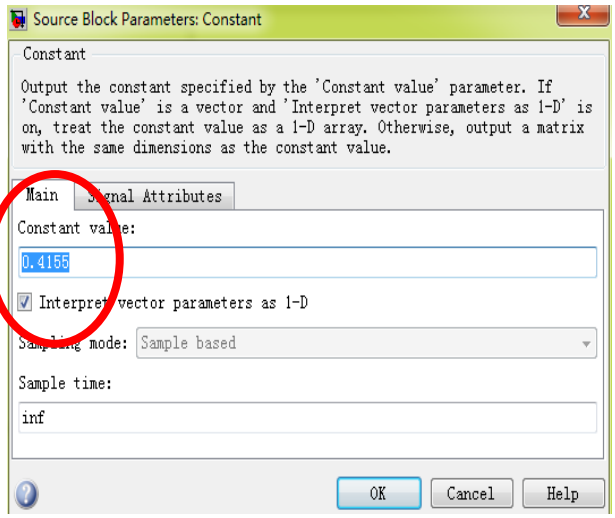


This switch is used to control the ramp's distance. When the s(the displacement) is shorter than 1 meter(on the slope or ramp)the F the SSV get (expect the air resistance) is:

$F=m*g*\sin\theta - C_{rr}*m*g*\cos\theta$;

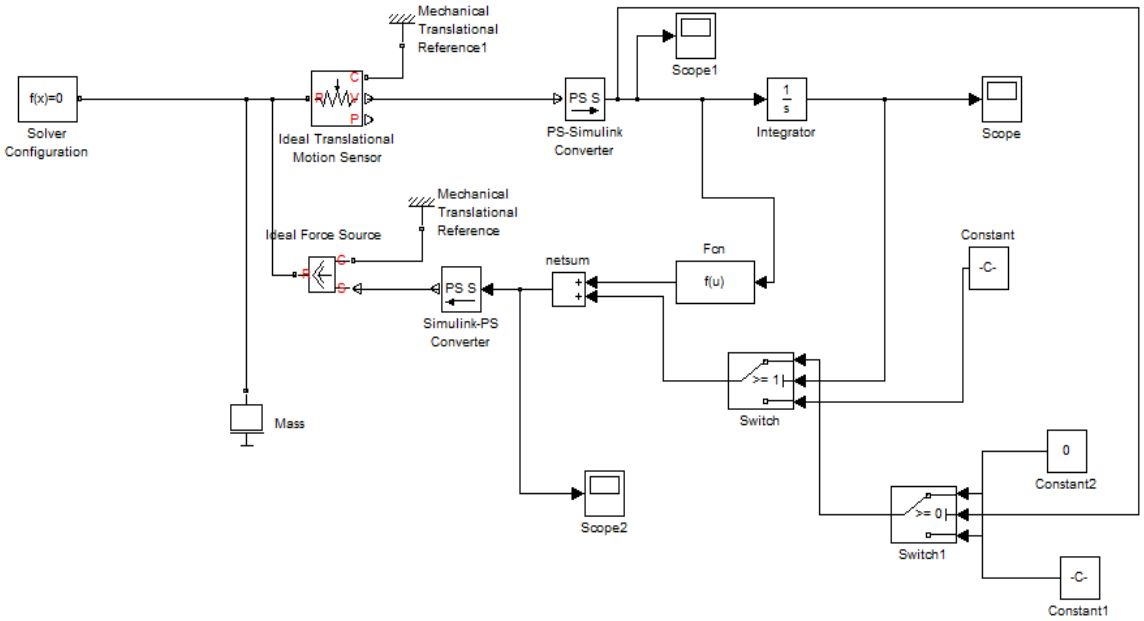
In our condition m=1kg; g=9.81m/s^2; $\theta = 3$, so we get the F=0.4155N

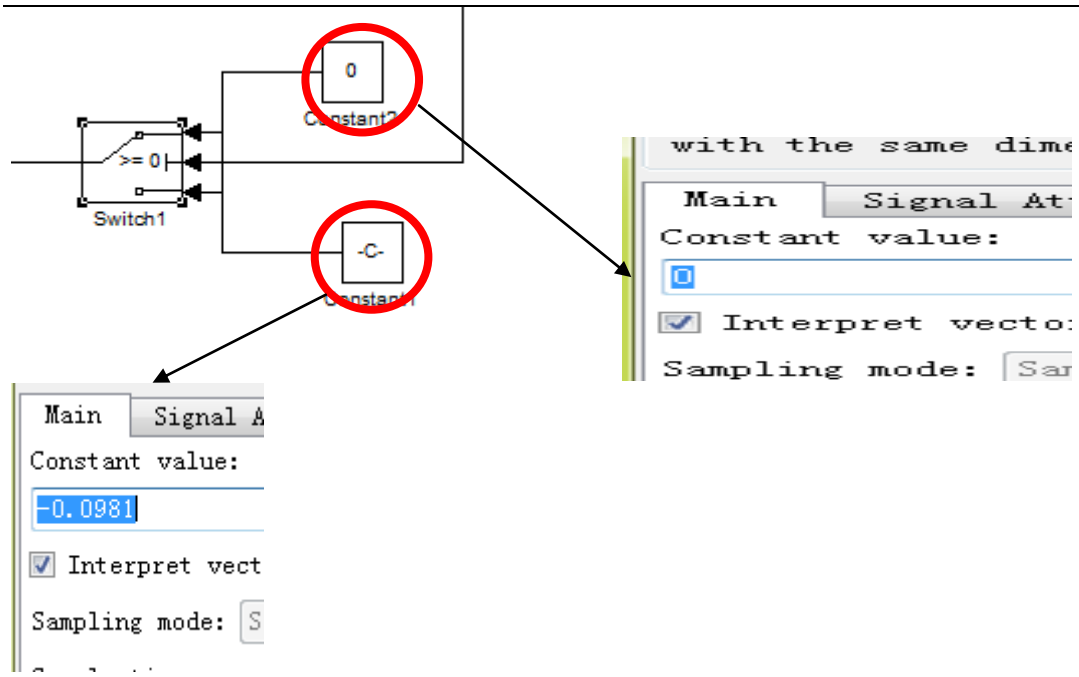




3. Velocity

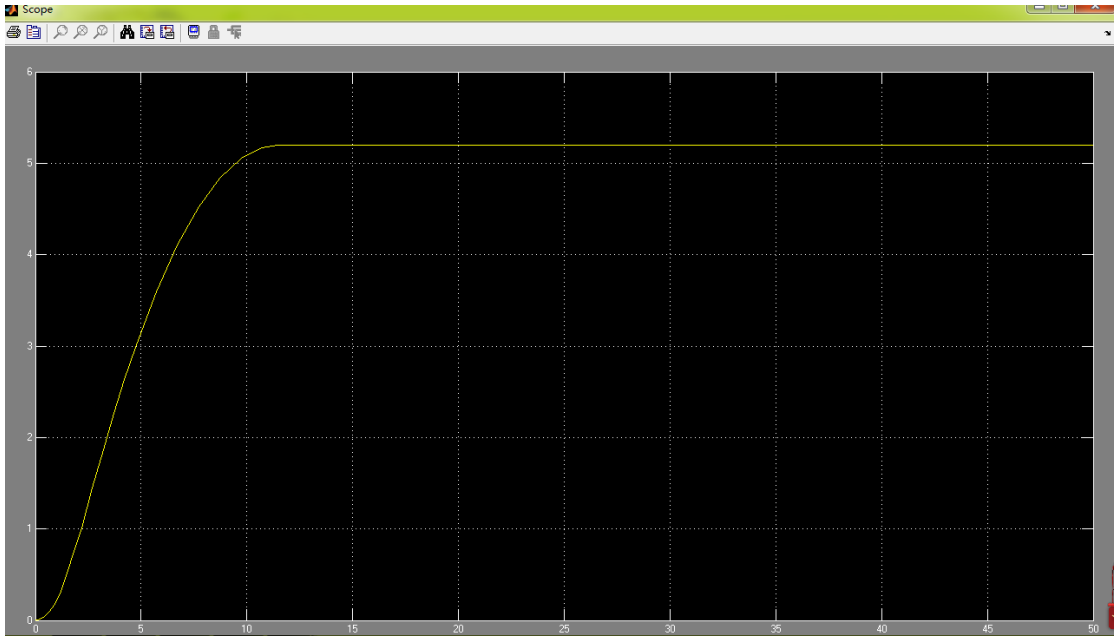
We use this switch to control the velocity. Because when our SSV gets on the flat, the SSV only gets the resistance when the V>0m/s. So we use the switch to change the force to 0N when the V<0m/s.





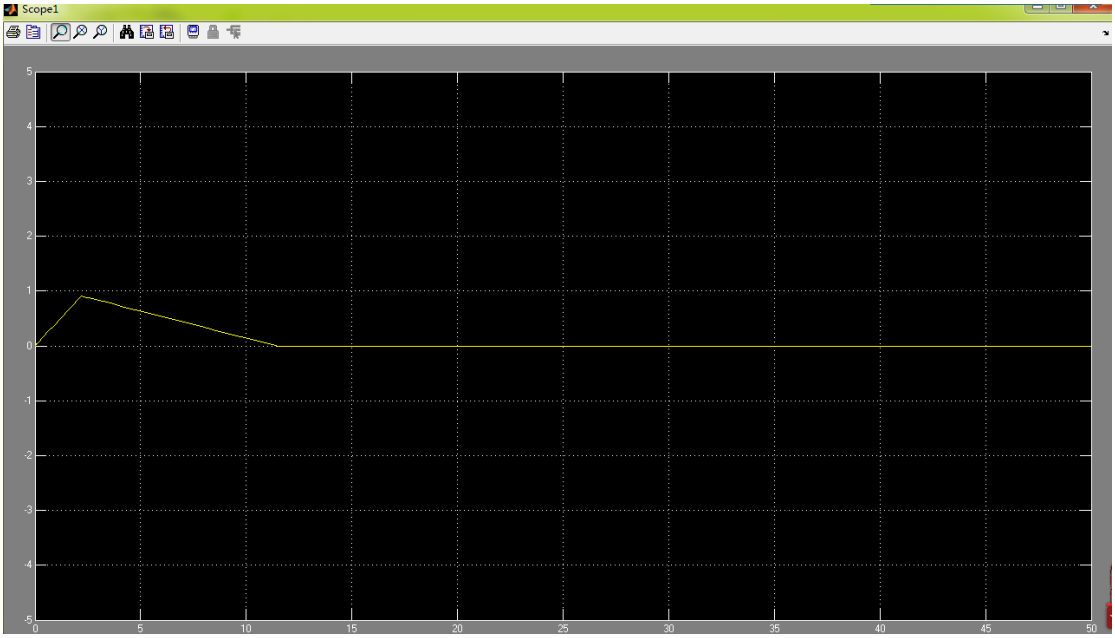
4. The result of our simulink

1) The s(displacement)



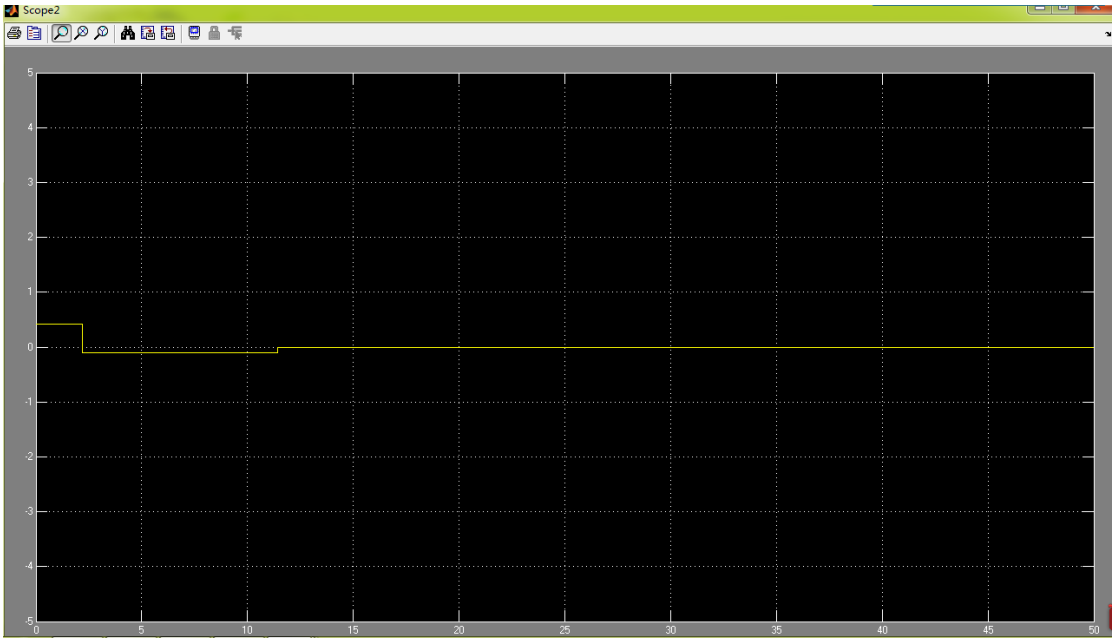
In this diagram, we can get the displacement increases from 0 when t=0s, and stops at 5.2m when t=11.5s.

2) The v(velocity)



We find that the velocity is increasing from 0m/s to 0.9m/s,during the t from 0s to 2.2s,because of the gravity. And then is decreasing from 0.9m/s to 0m/s,during the t form 2.2s to 11.4s because of the resistance.

3) The F(force)



The force is 0.4155N during t=0s to t=2.2s, and then it changes to

0.0981N(the Fcn is so small) from t=2.2s till t=11.4s.