Introduction to Automotive
Report
Lab 2: Braking System with PI Controller

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Brake System with PI Controller:

Proportional Integral is a type of controller that decreases the rising time making the system faster and decreases the steady state error. The PI controller is used to control the slipping percent of the front wheels, aiming to keep it at 10% at which peak force occurs, to decrease the stopping distance as much as possible while making sure the vehicle tires will not slip on the ground.

MATLAB Snippets:

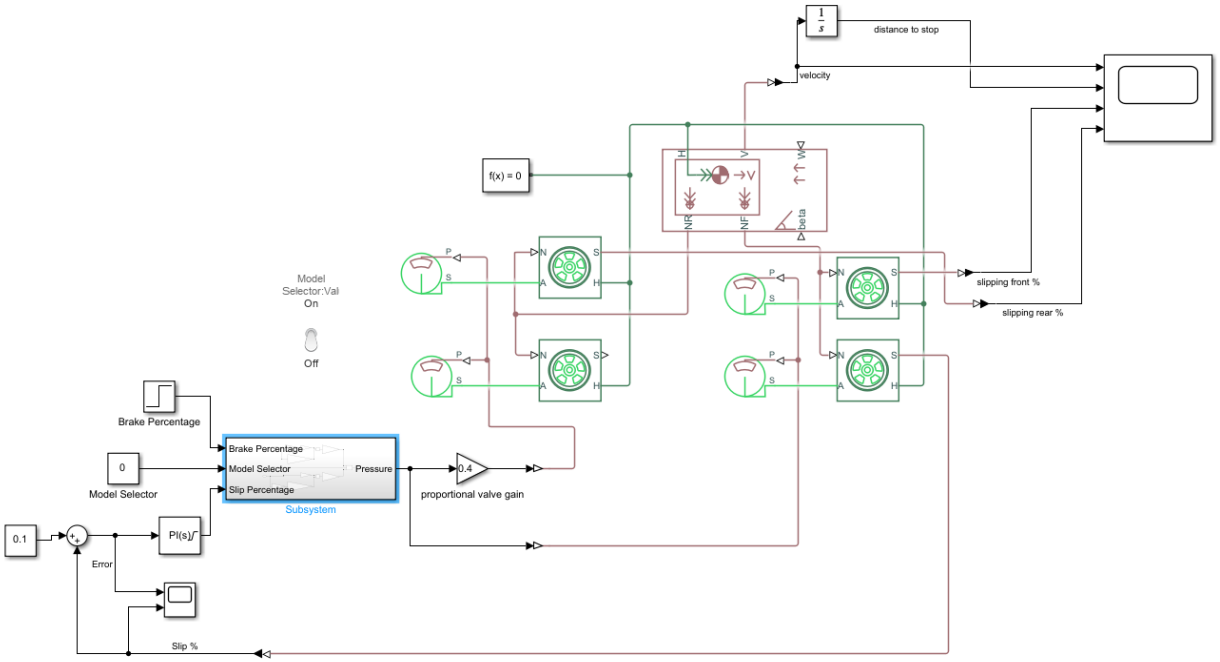

Figure 1 MATLAB Model

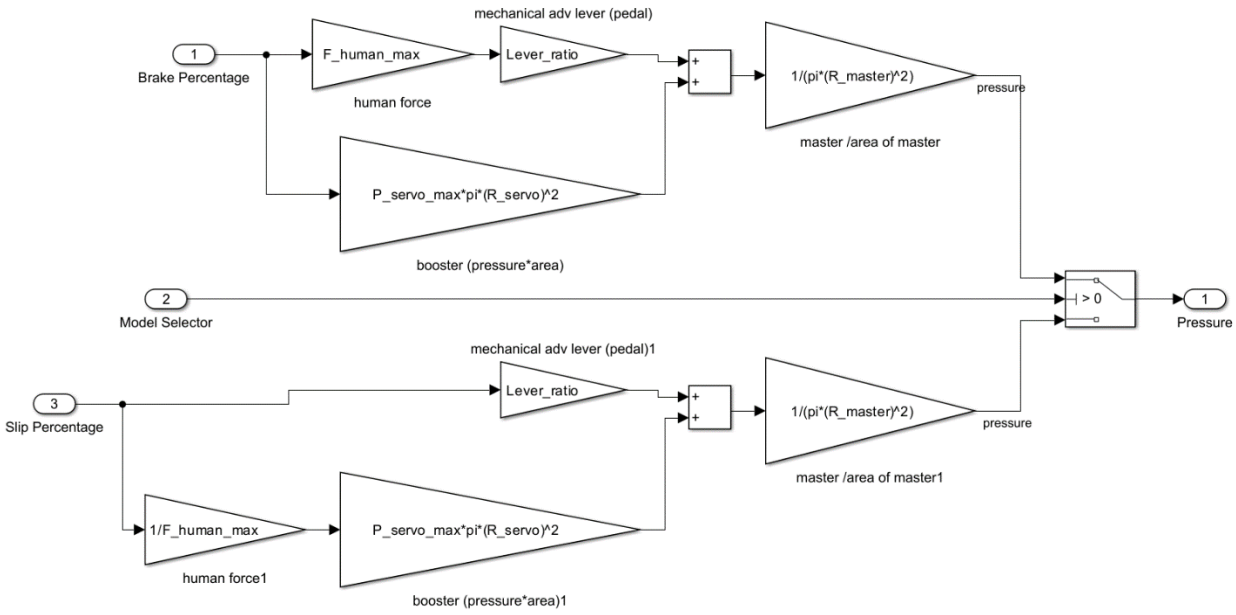

Figure 2 Human to Disk

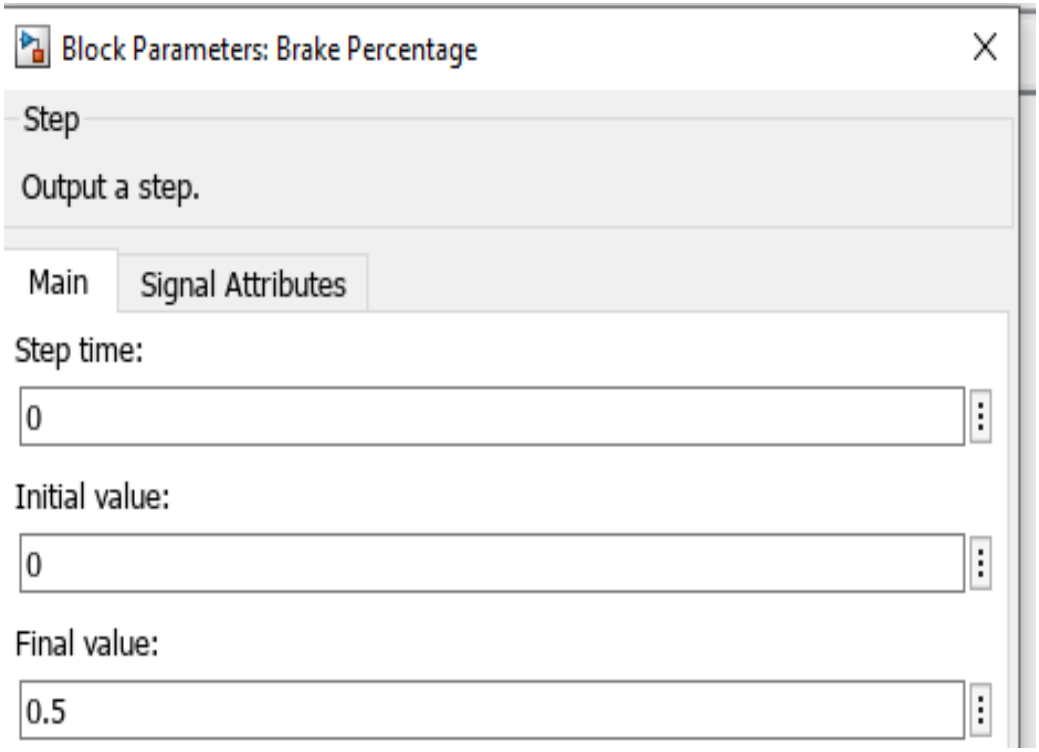

Figure 3 Max Human Force no Slip

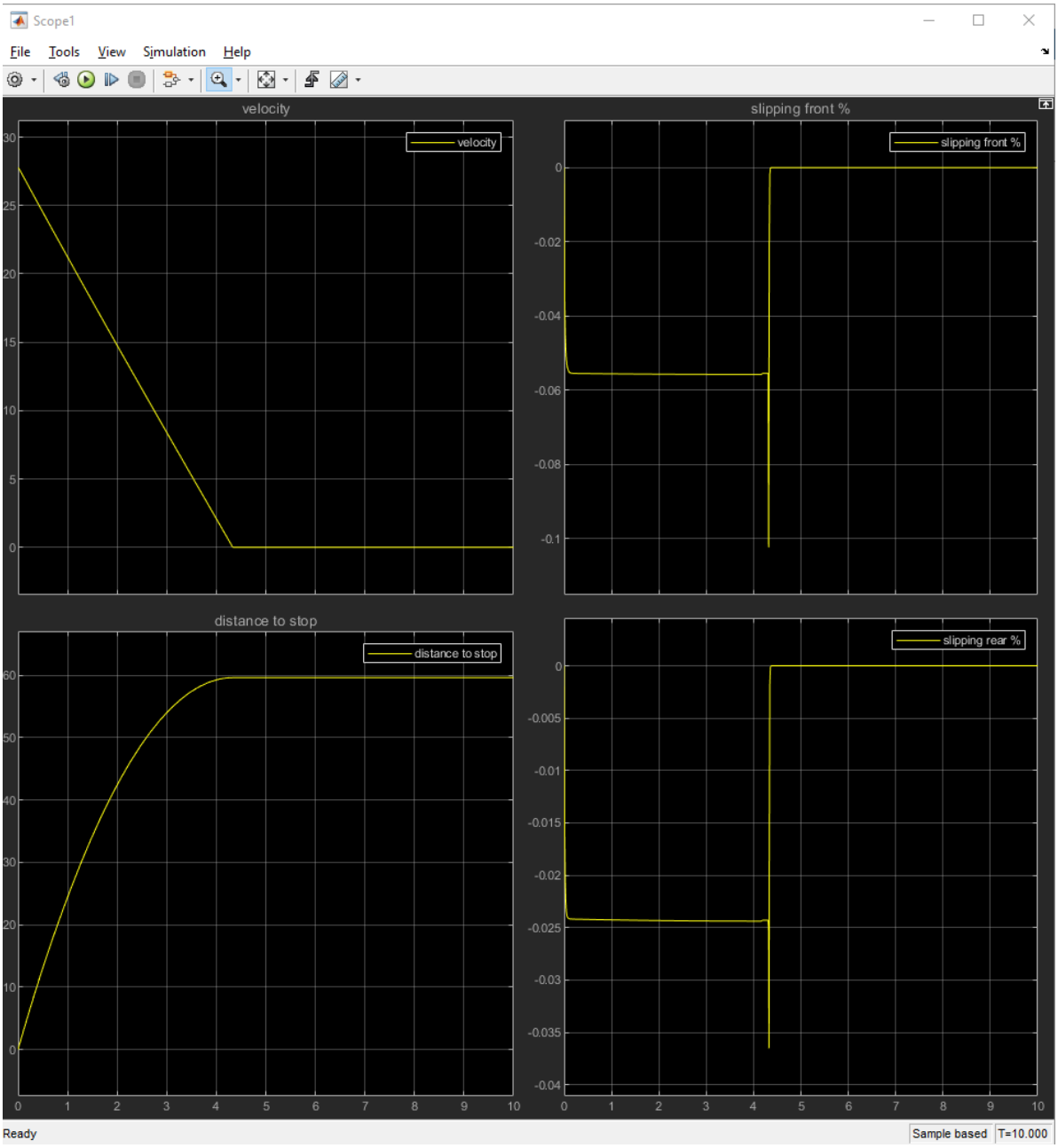

Figure 4 Result Lowest Distance no Slip

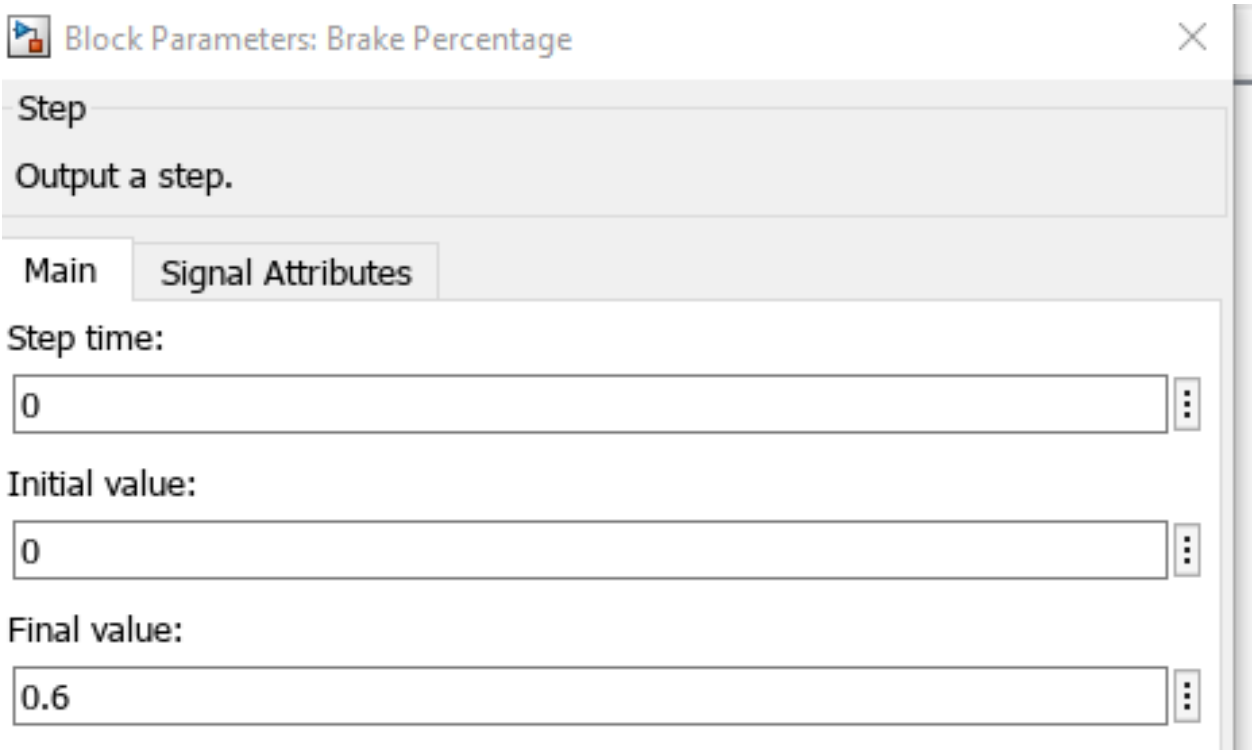

Figure 5 Lowest Human Force no Slip

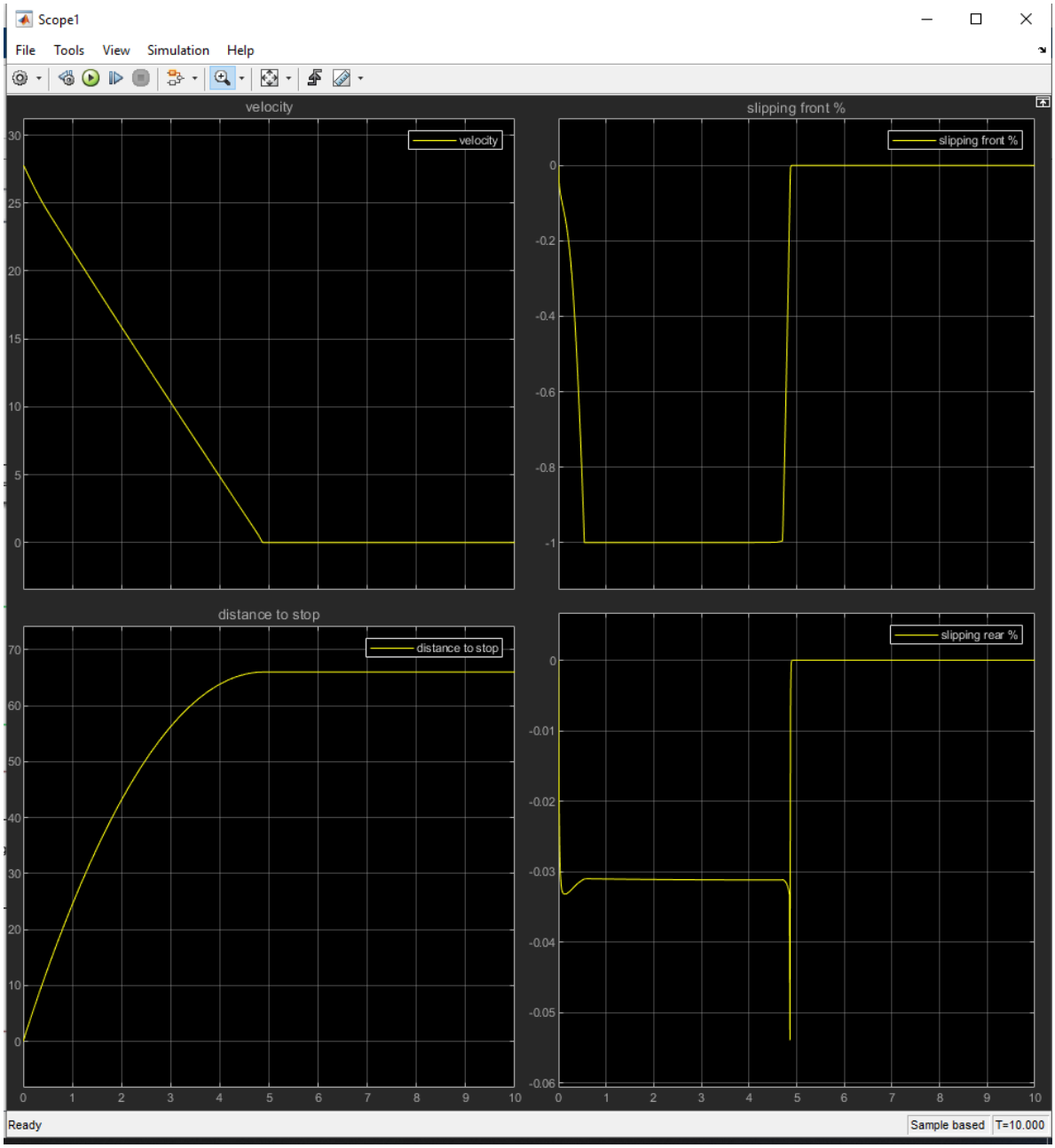

Figure 6 Result

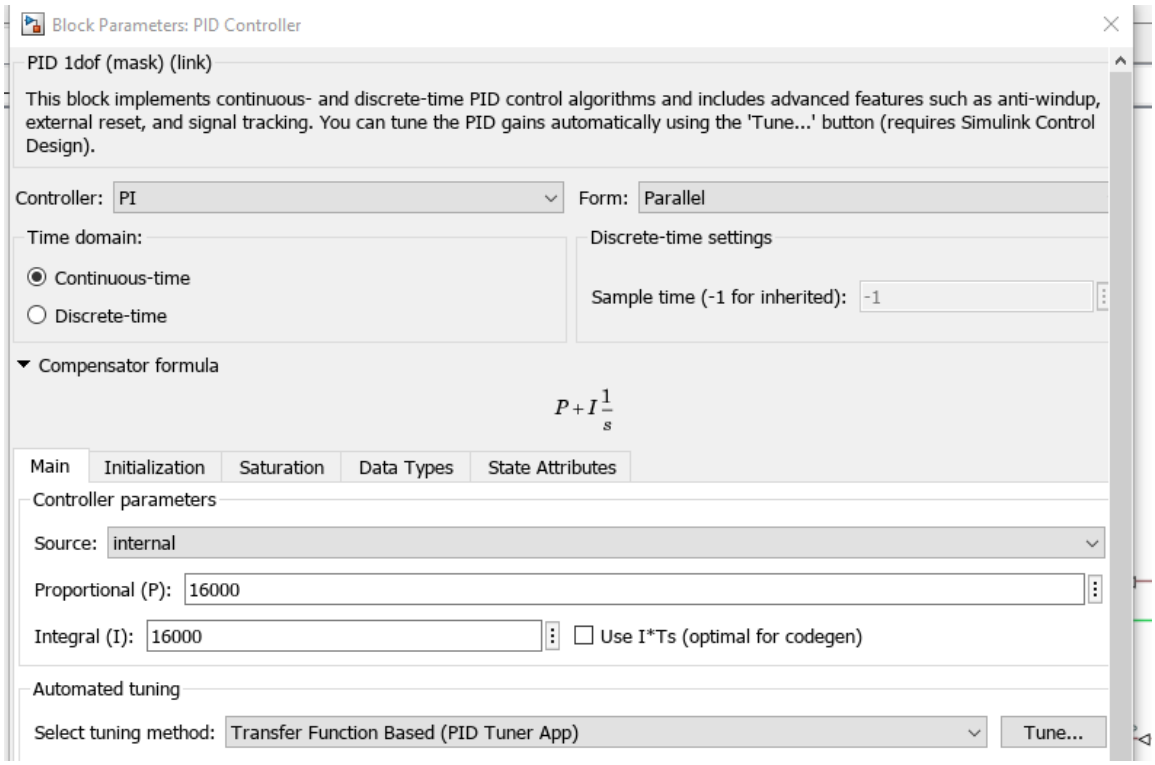

Figure 7 PI Controller

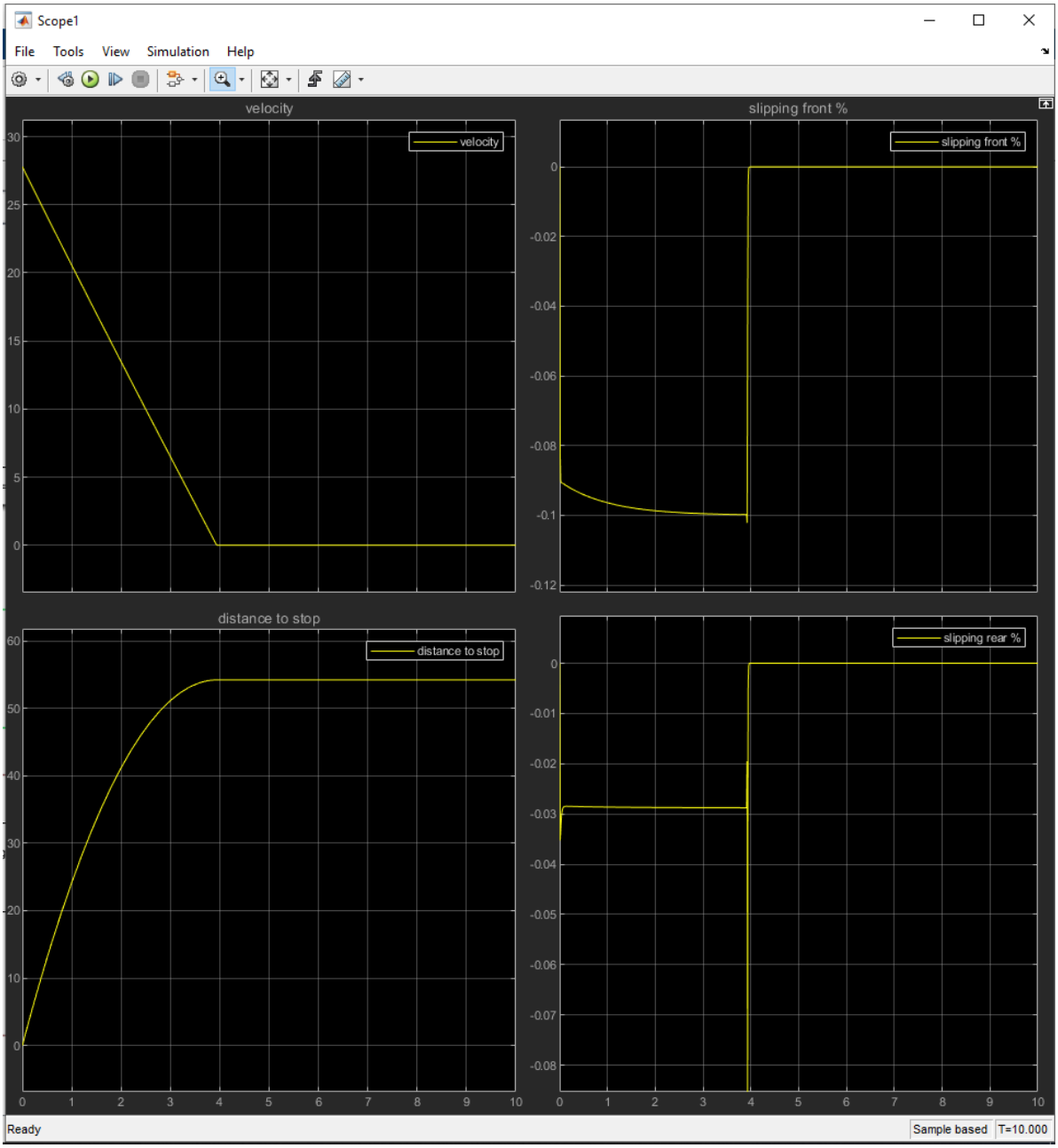

Figure 8 Result of PI Controller

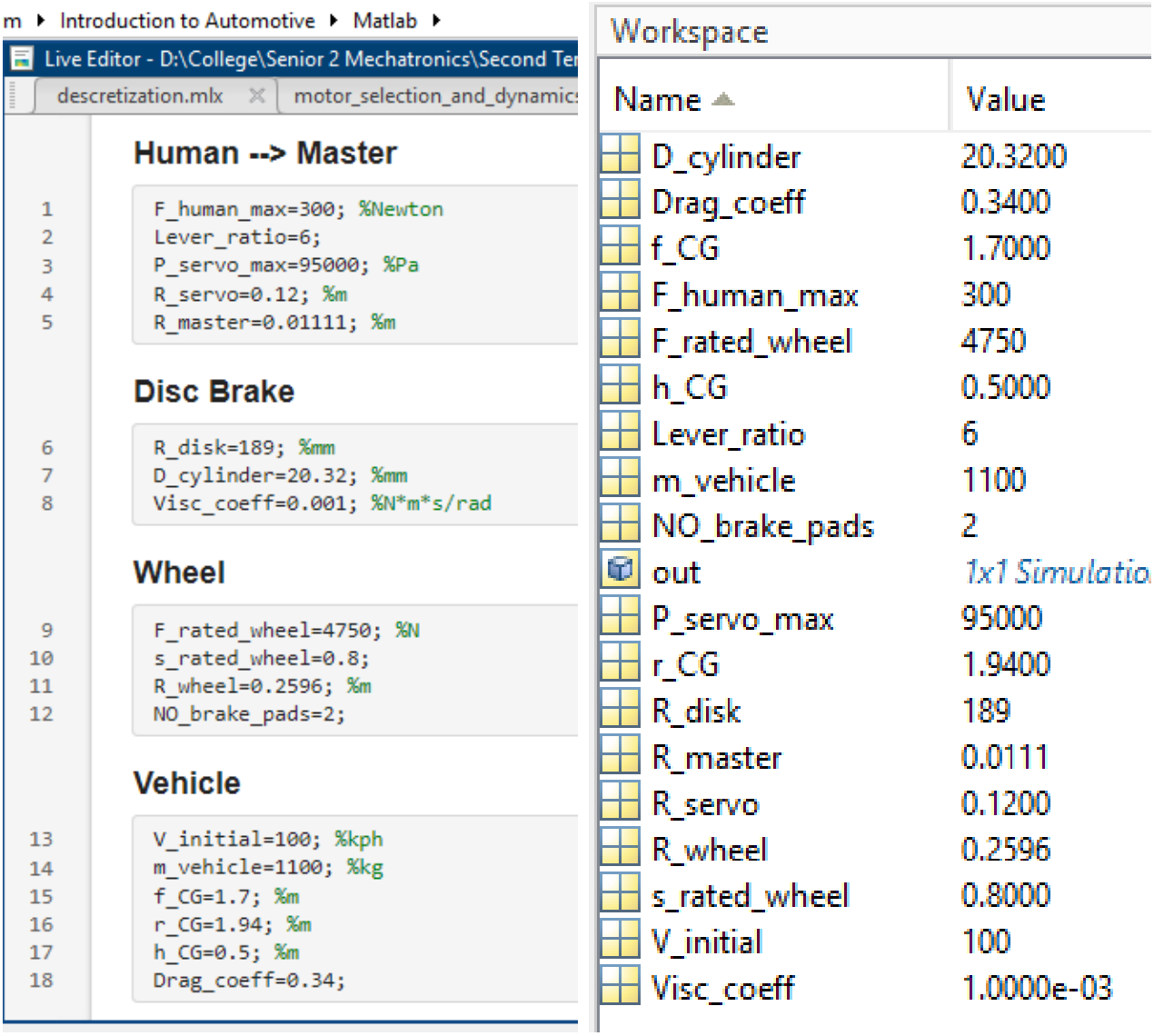

Figure 9 MATLAB Live Script

Comments:

- The resulting stop distance with PI controller is lowest as the controller controls and tries to hold the slipping percent of front wheel at 0.1.
- If slipping occurs even if on one wheel the stopping distance increases.