CONTROL SYSTEMS

Telescope project

SOEN 385

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Presented to

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# ABSTRACT

# INTRODUCTION

We are tasked with having a telescope take two pictures of 100 stars with specific positions in the sky. Each star has a coordinate indicated by its r, and values, representing their position as a distance and two angles. The telescope can rotate its orientation to point at these stars using two DC motors, one controlling the angle, the other the angle. These motors require a control system for optimal functionality.

The system we need to use is a PID closed-loop control system, with the following requirements:

* Maximum overshoot of 2%
* Maximum settling time of 2 seconds

Three different G(s) and H(s) functions are given and need to be tested using a P, PI, PD, and PID method.

The three sets of transfer functions are:

* G(S) = 1/(S-1)(S-3); H(S) = 1
* G(S) = 1/(S+1)(S-3; H(S) = 0.1
* G(S) = 1/(S-3); H(S) = 0.1/(S+1)

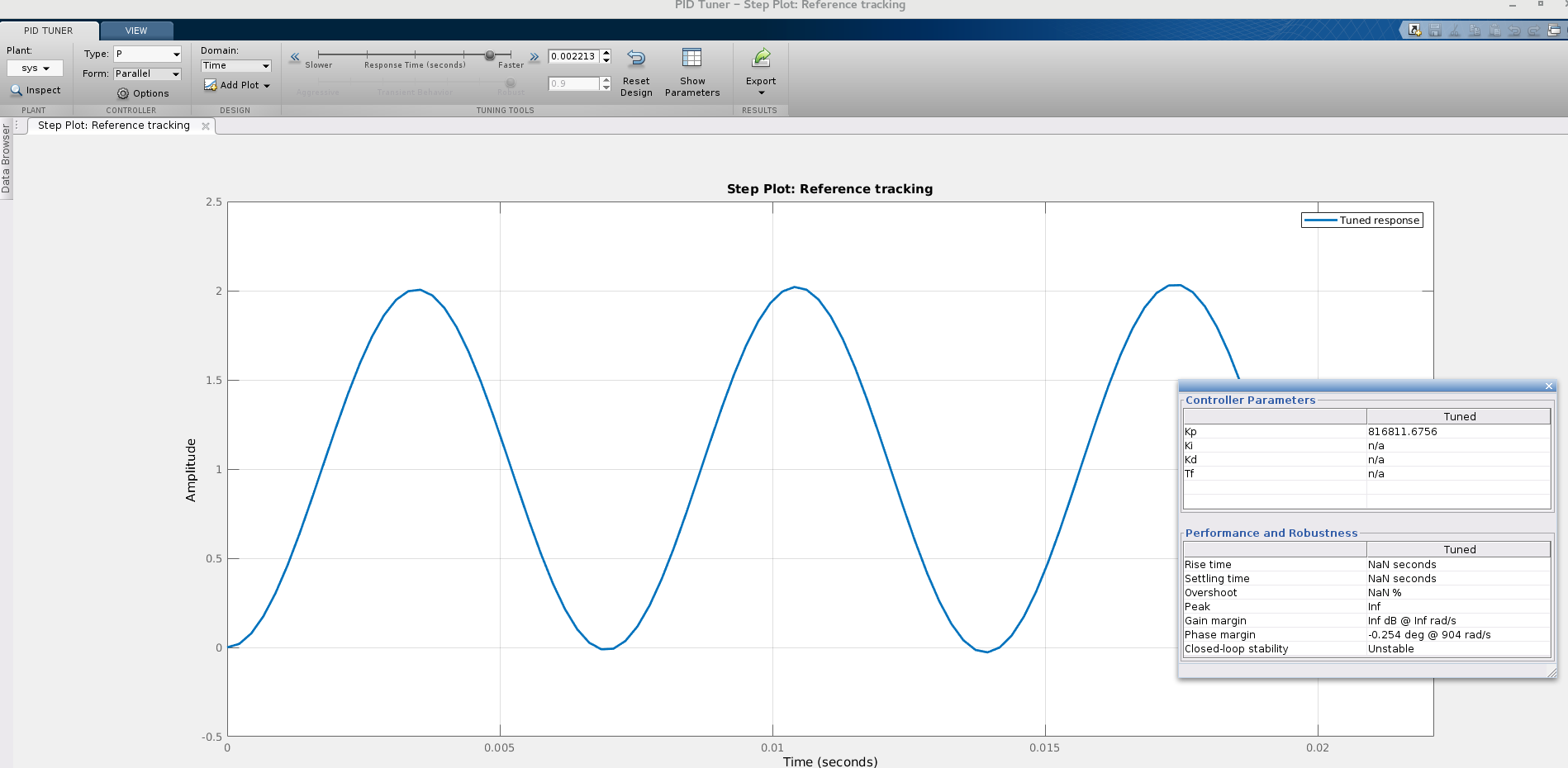
Each transfer function will need to have K values used for the PID controller. These can be achieved using MatLab and Simulink to create a virtual system with the proper parameters. Once all is set up, a 3D model representing the system is used to demonstrate its functionality over time.

# ANALYSIS

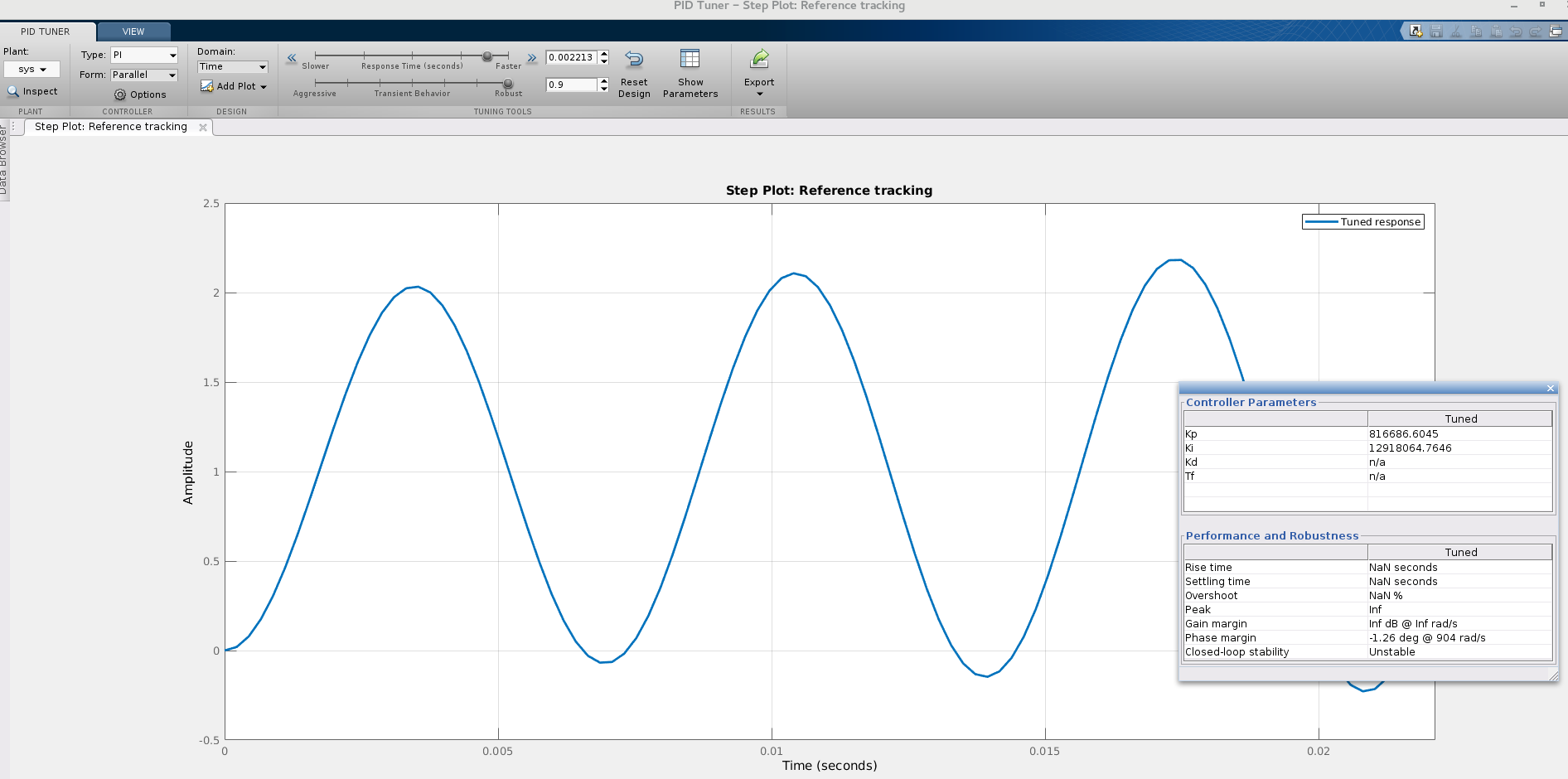
a) Using the G(S) = 1/(S-1)(S-3), and H(S) to be equal = 1.

We get the following results for

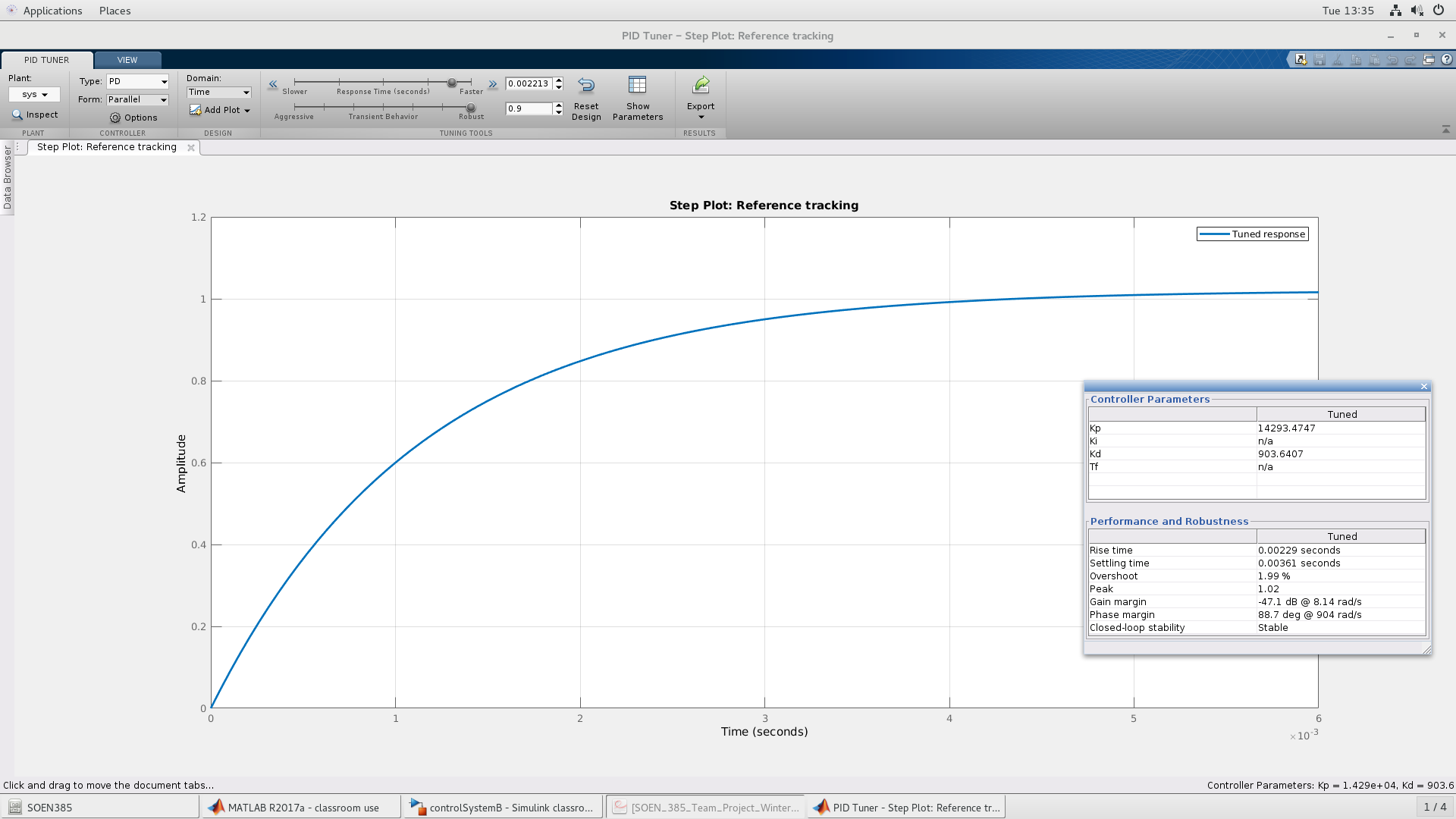
**The P system**

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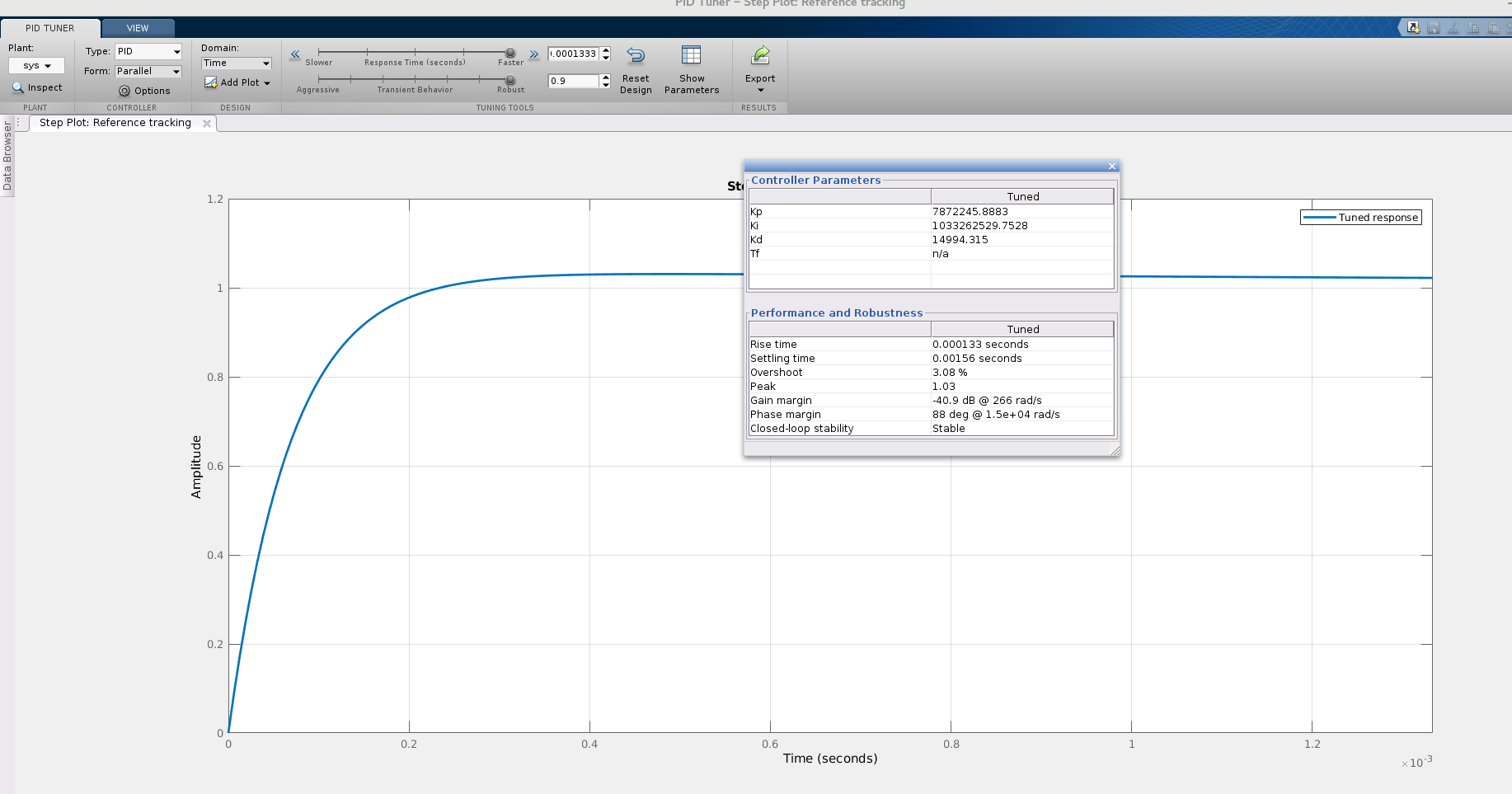
**The PI system**



**The PD system**



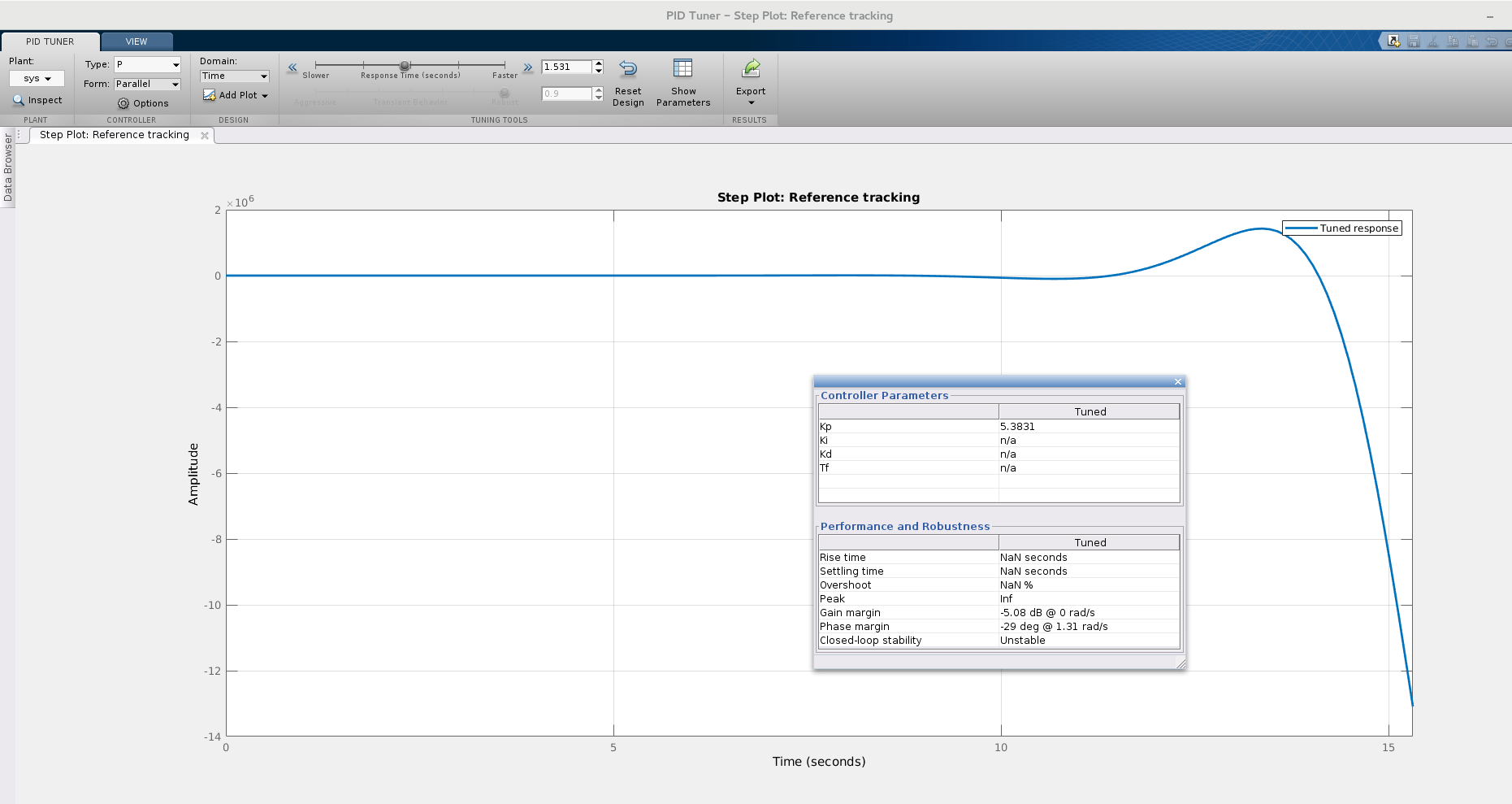
**The PID system**



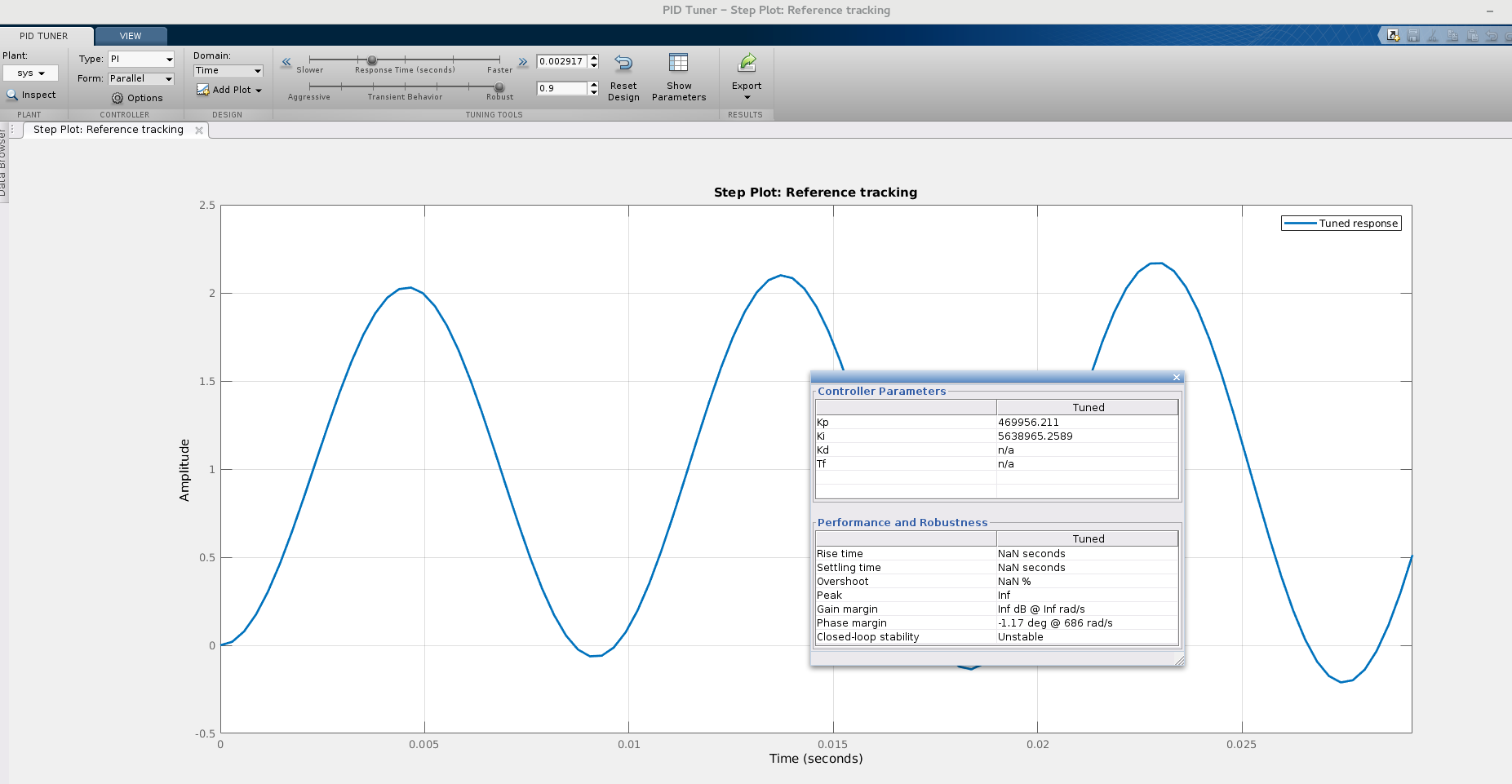
b) Using the G(S) = 1/(S+1)(S-3), and H(S) to be equal to = 0.1

We get the following results for

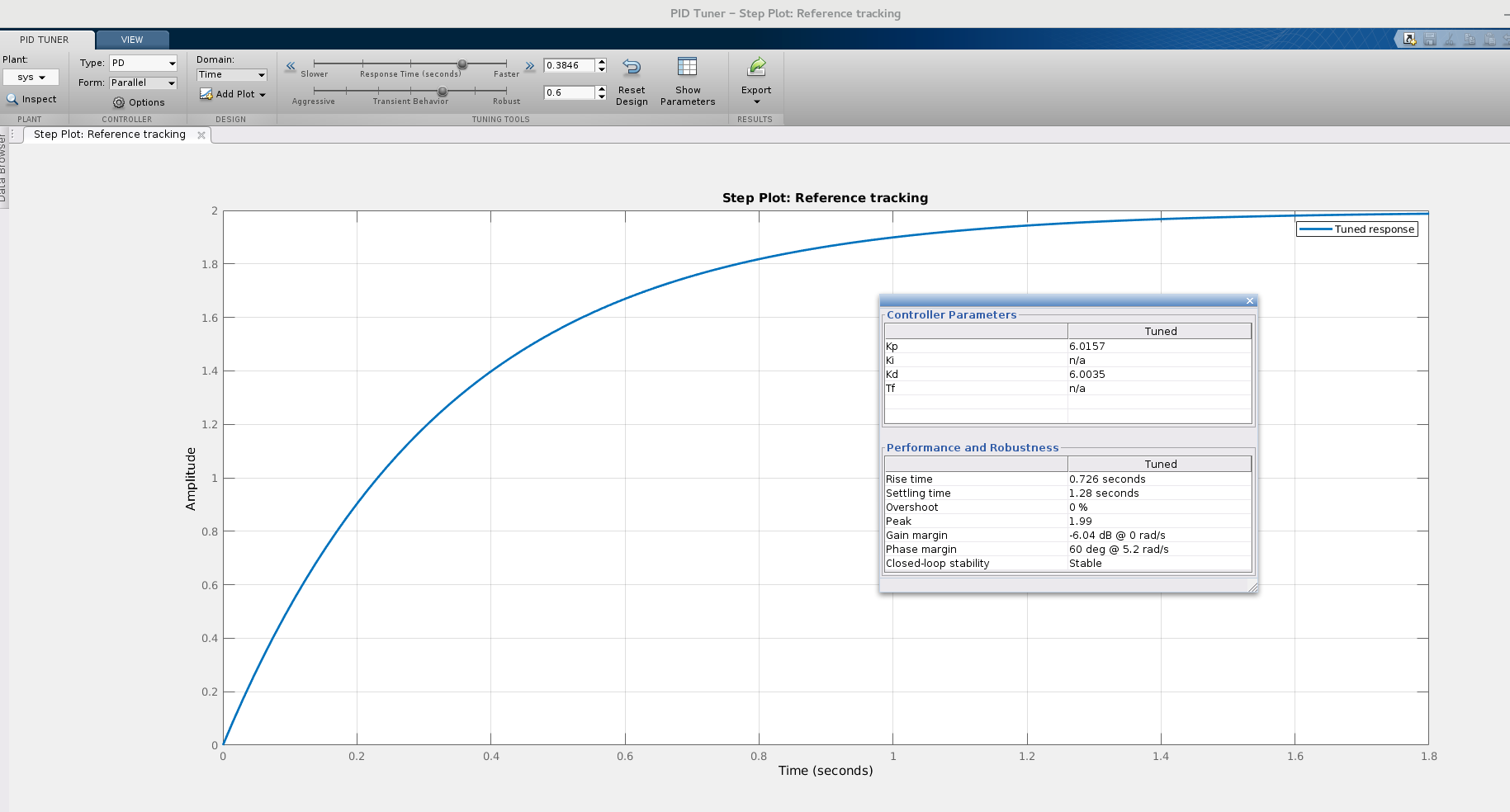
**The P system**



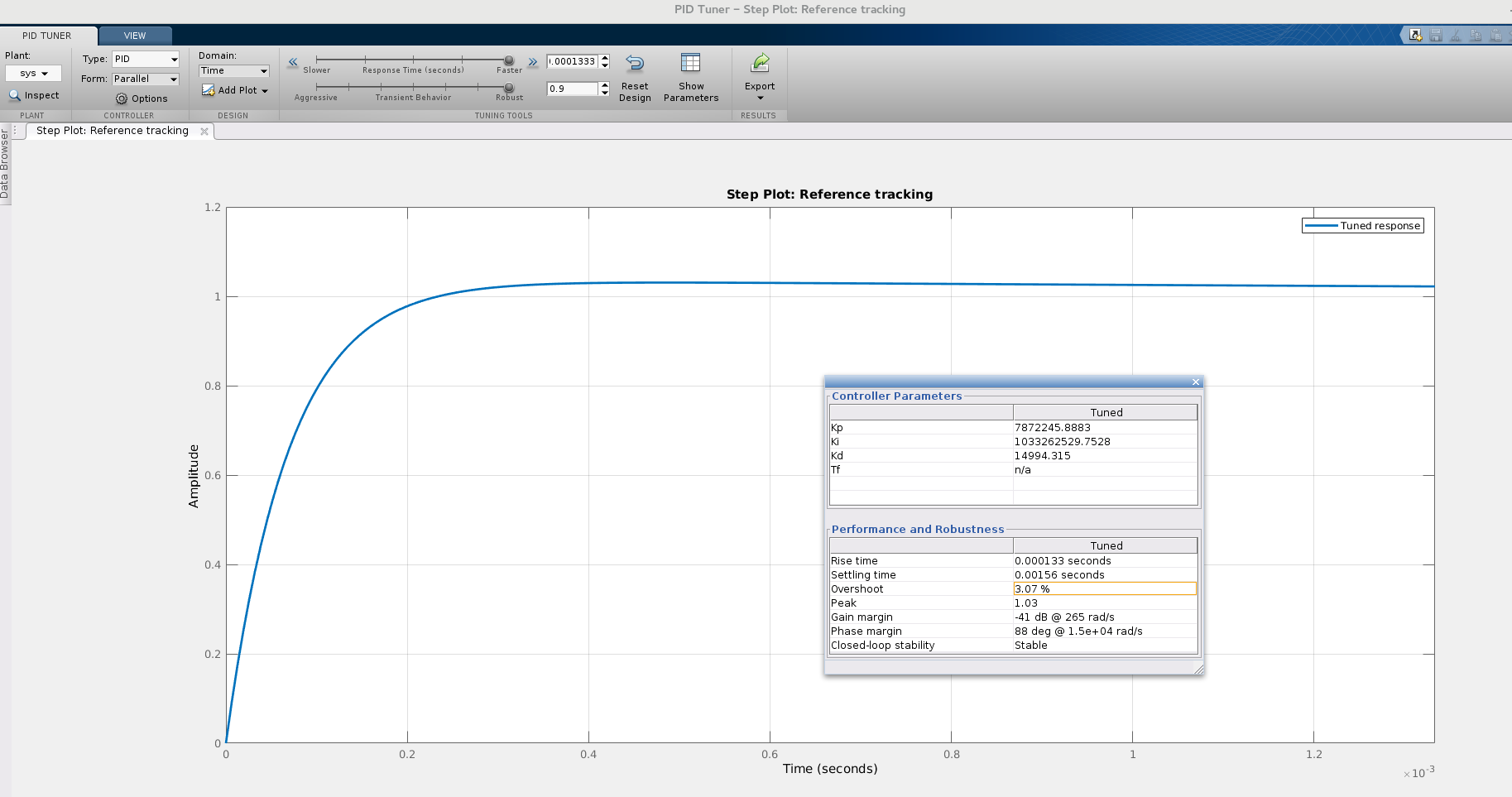
**The PI system**



**The PD system**



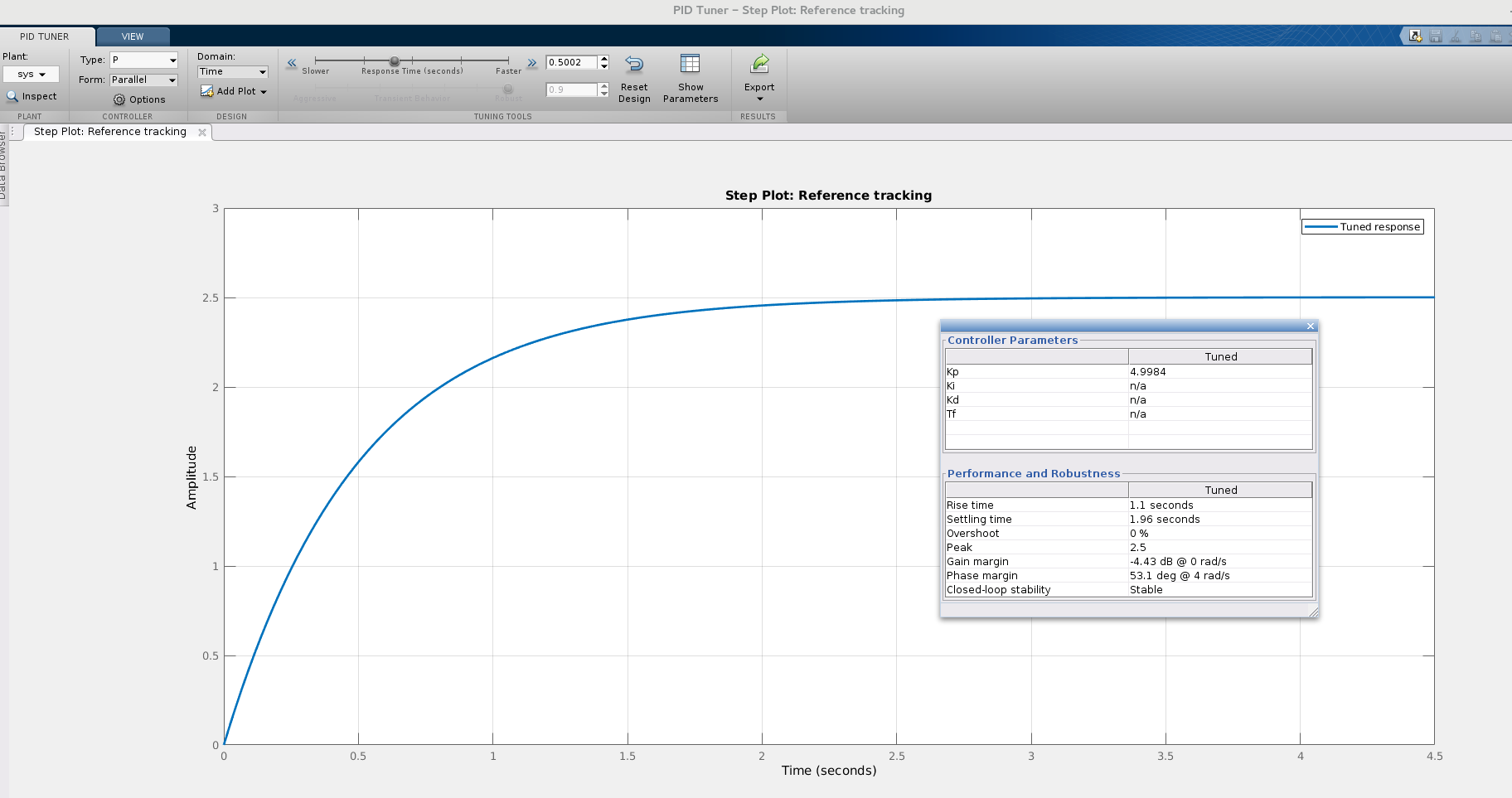
**The PID system**



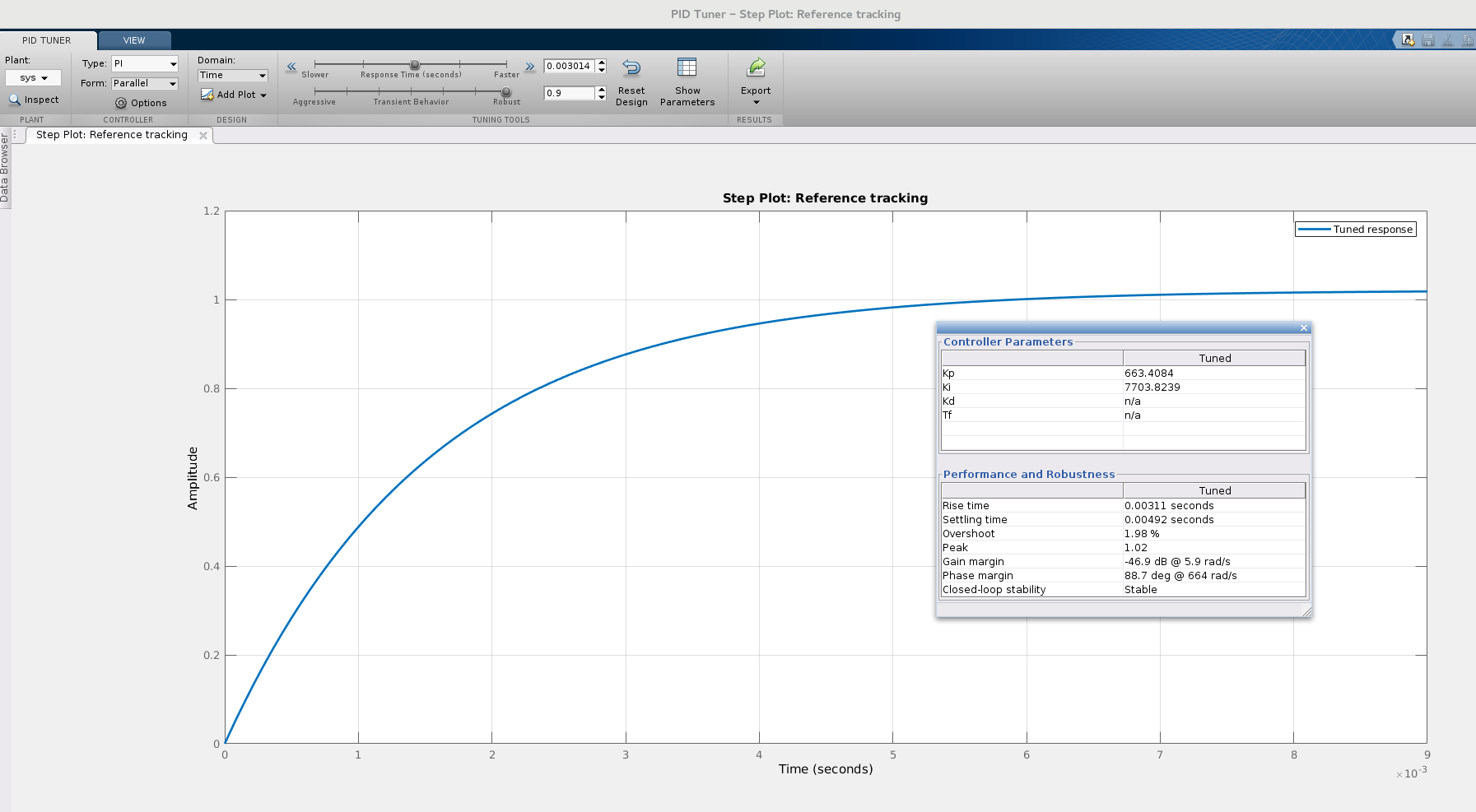
c) Using the G(S) = 1/(S-3) and H(S) to = 0.1/(S+1)

We get the following results for

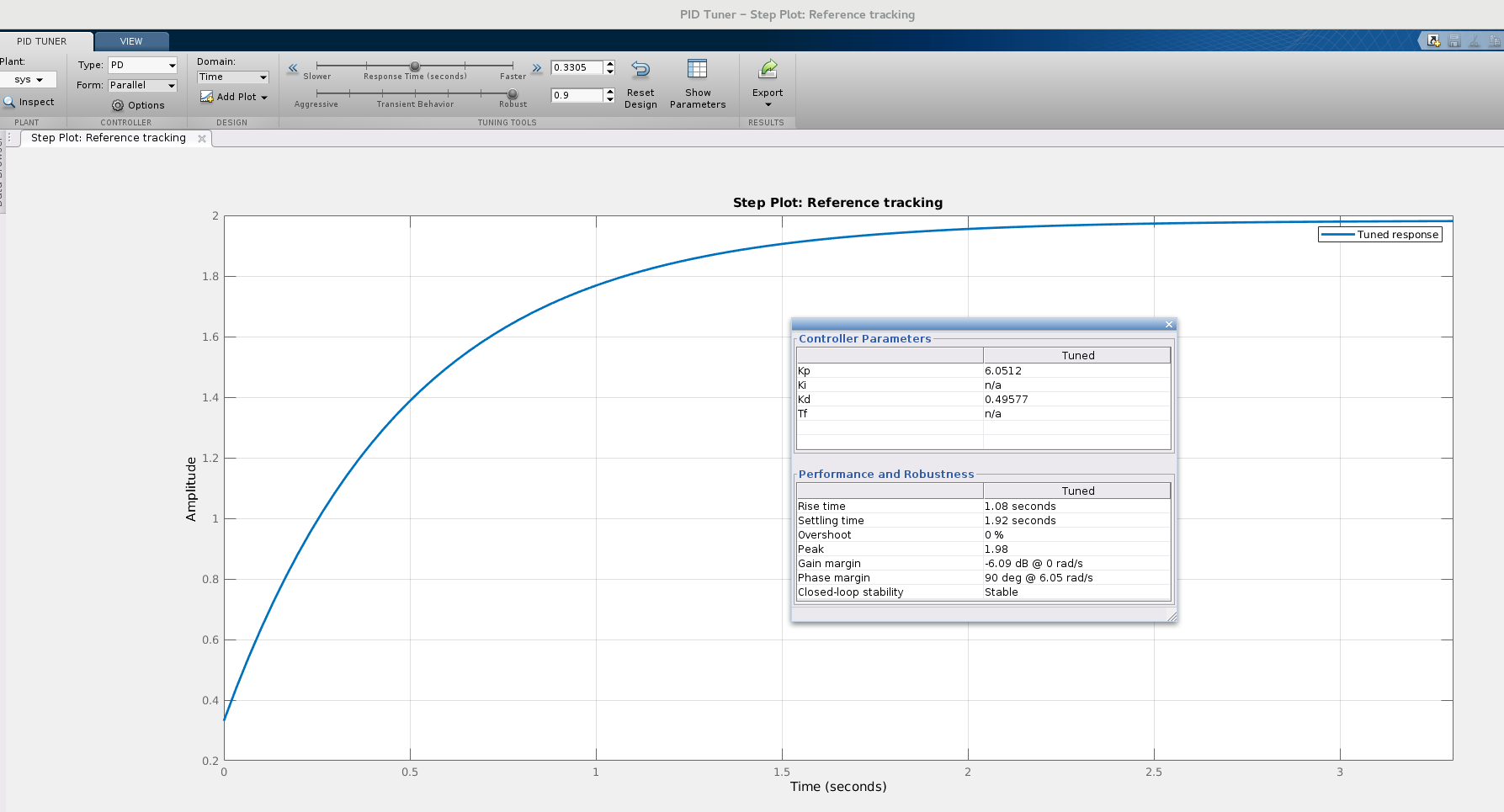
**The P system**



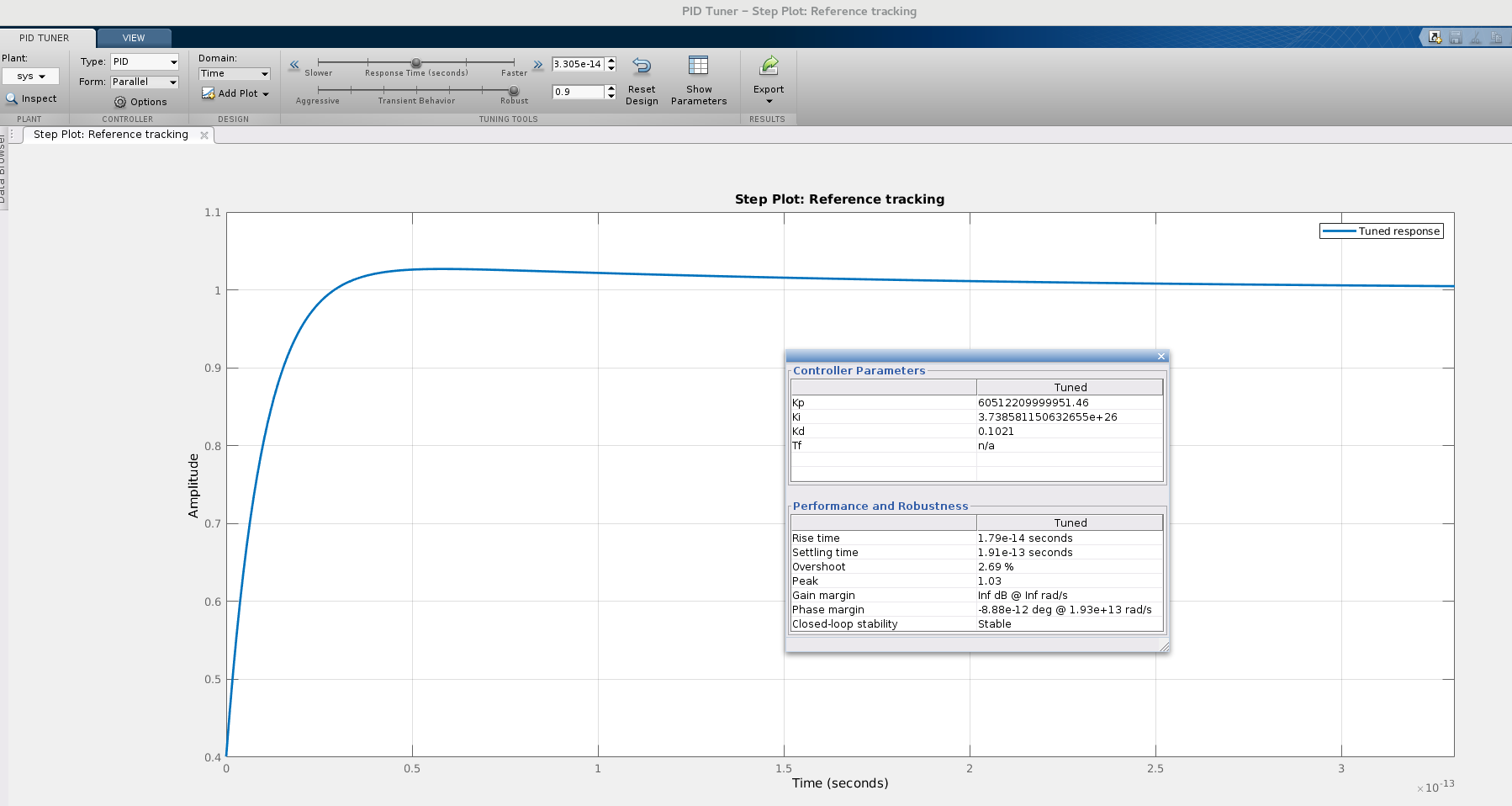
**The PI sytem**



**The PD system**



**The PID system**



# DESIGN

We designed it using matlab and Simulink the end.

# IMPLEMENTATION

We implemented it using matlab and Simulink the end.