Control Engineering

Handout – Online Laboratory 10

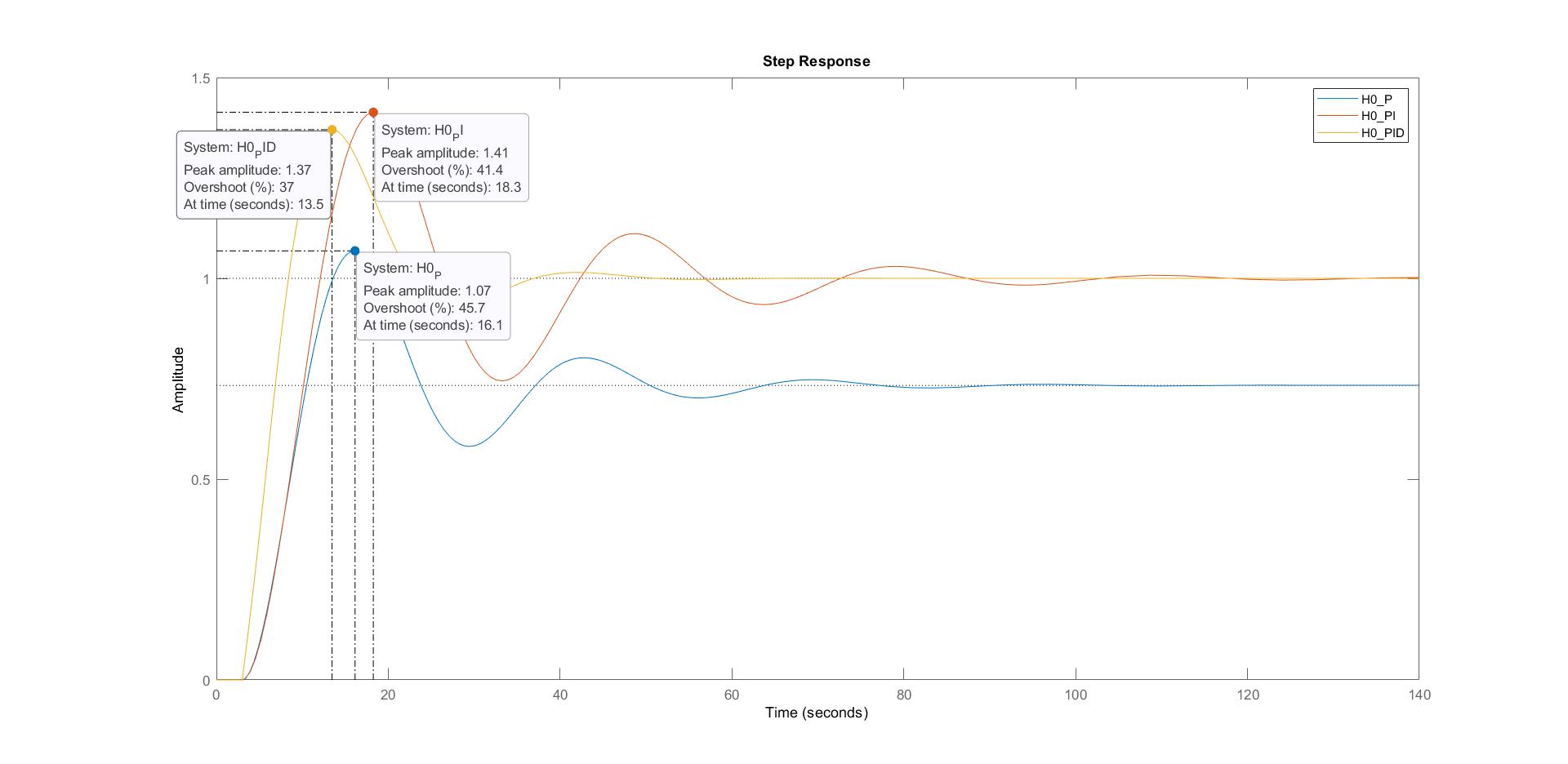
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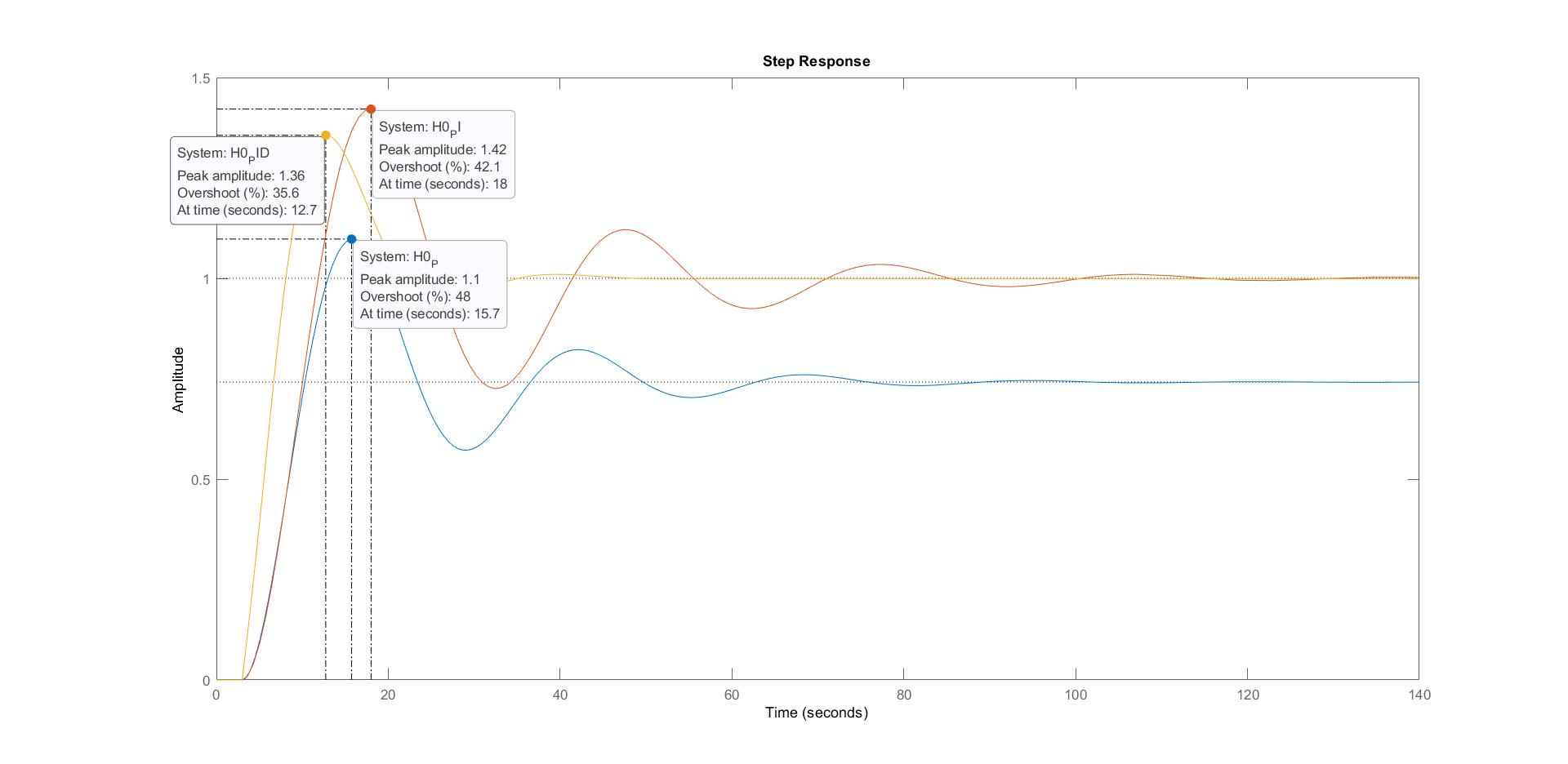
For the process described by



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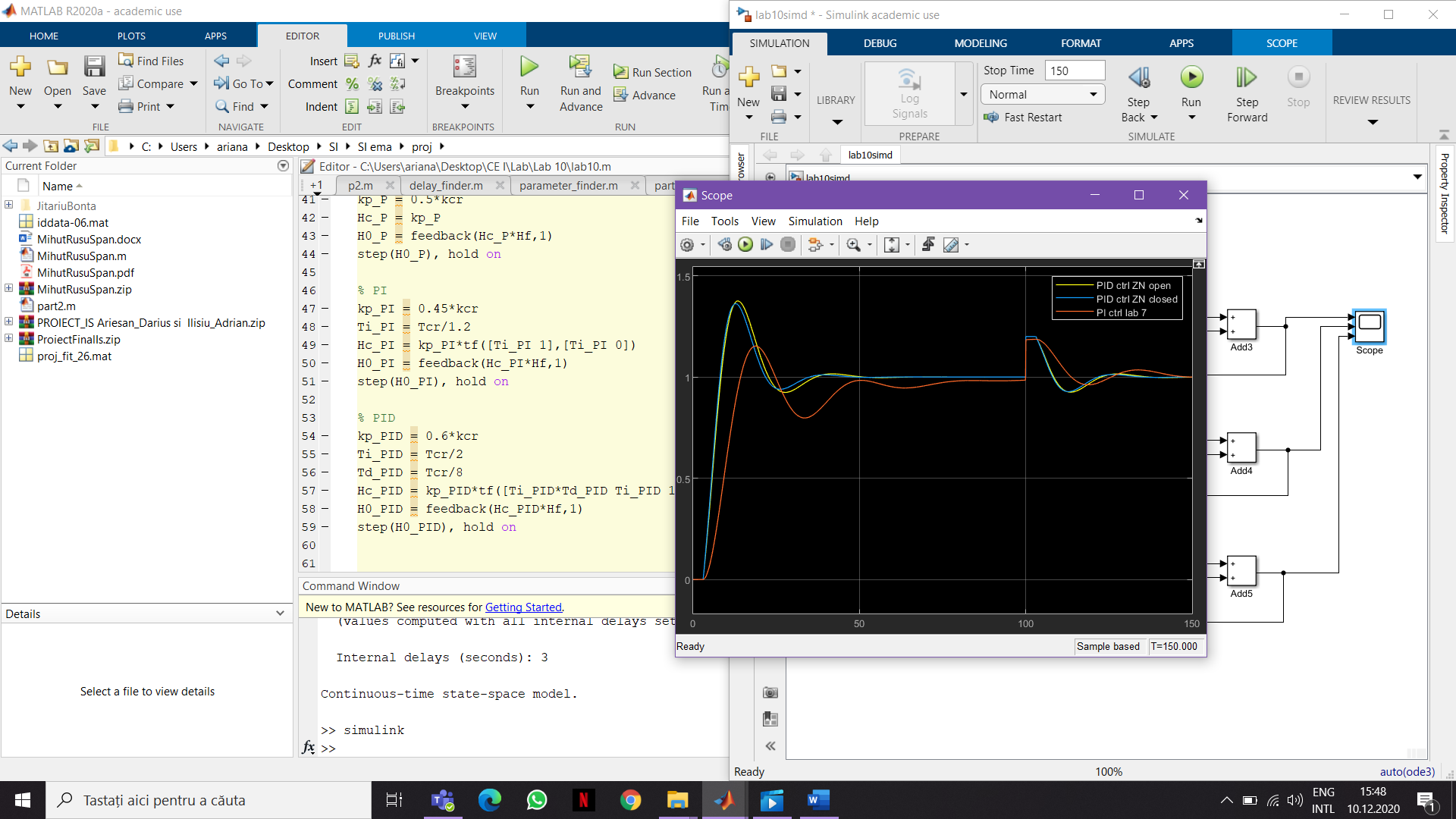
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1. Compare the responses of the closed loop systems with the two PID controllers from a) and b) with the PI controller tuned using frequency domain methods in Lab 7.



*We can see that the overshoot is almost the same for the PID ctrl and for the PI is smaller. The PID ctrl settles faster than the PI.*

1. Add a step disturbance of amplitude 0.2 at the output of the processes from c). Compare the three controllers from the disturbance rejection perspective.



*We can see that the overshoot for the PID ctrl ZN open loop (yellow) is almost 40% and the settling time is about 50 sec. And the steady state error is 0. Then, at 100 sec the output is 1 but we have a disturbance of 0.2 -> it goes to 1.2 and remains at 1.2 for 3 sec (the time delay). It means that the output doesn’t change because it needs 3 sec in order to react to any change. And after 3 sec the output goes to its initial value. And because of the integrator it can reject step disturbances.*

*For the PID ctrl ZN close loop (blue) it is quite similar to the yellow one. The overshoot is a little bit smaller, but the settling time is almost the same. And also the disturbance rejection is almost the same.*

*For the PI ctrl form lab 7, the overshoot is smaller, the settling time is larger.*