

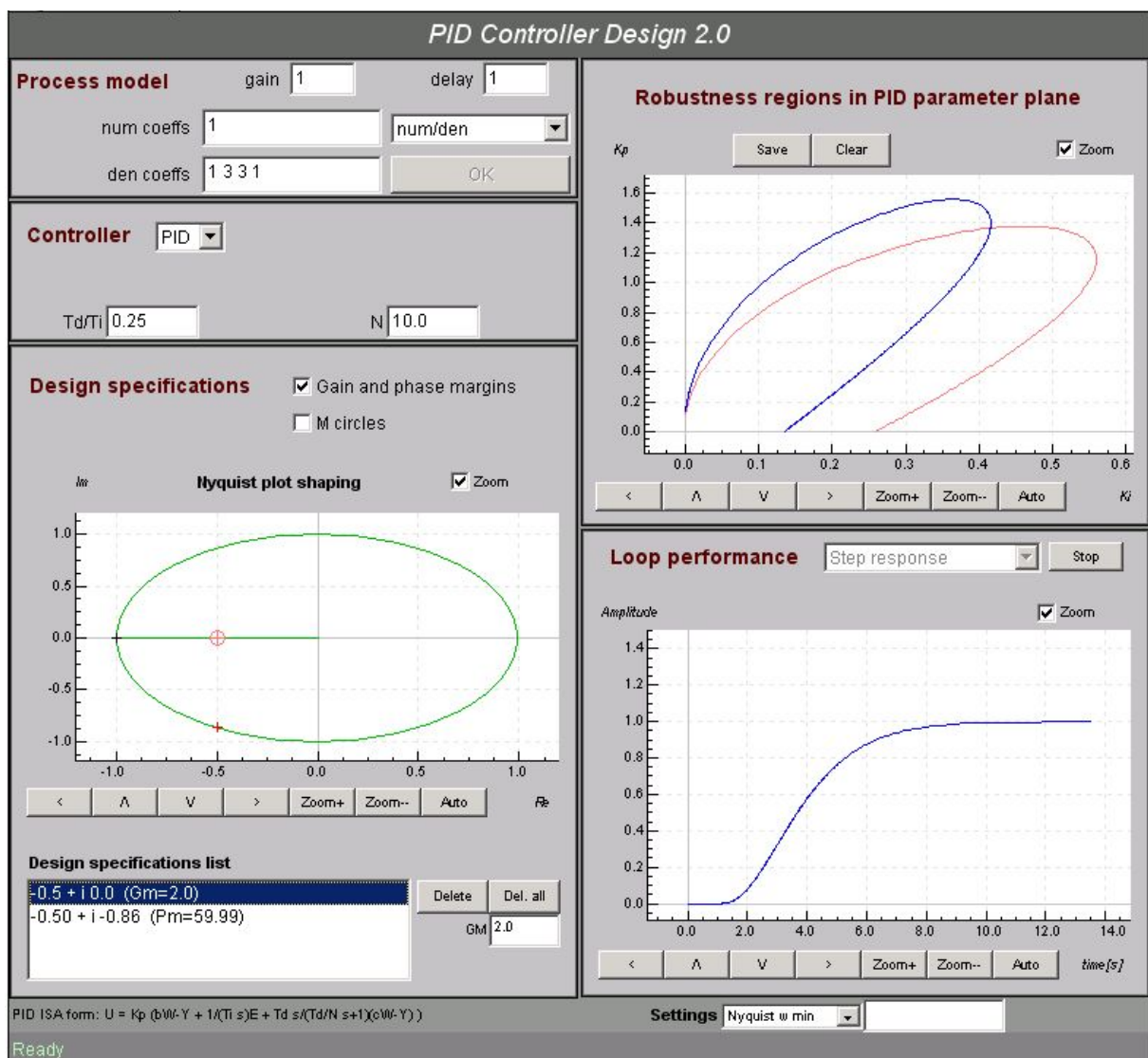
# Robust controller design for more processes using applet [www.PIDlab.com](http://www.PIDlab.com)

Let us assume two processes described by transfer functions

$$F_1(s) = \frac{e^{-s}}{s^3 + 3s^2 + 3s + 1}, \quad F_2(s) = \frac{e^{-2s}}{s^3 + 5s^2 + 5s + 1}$$

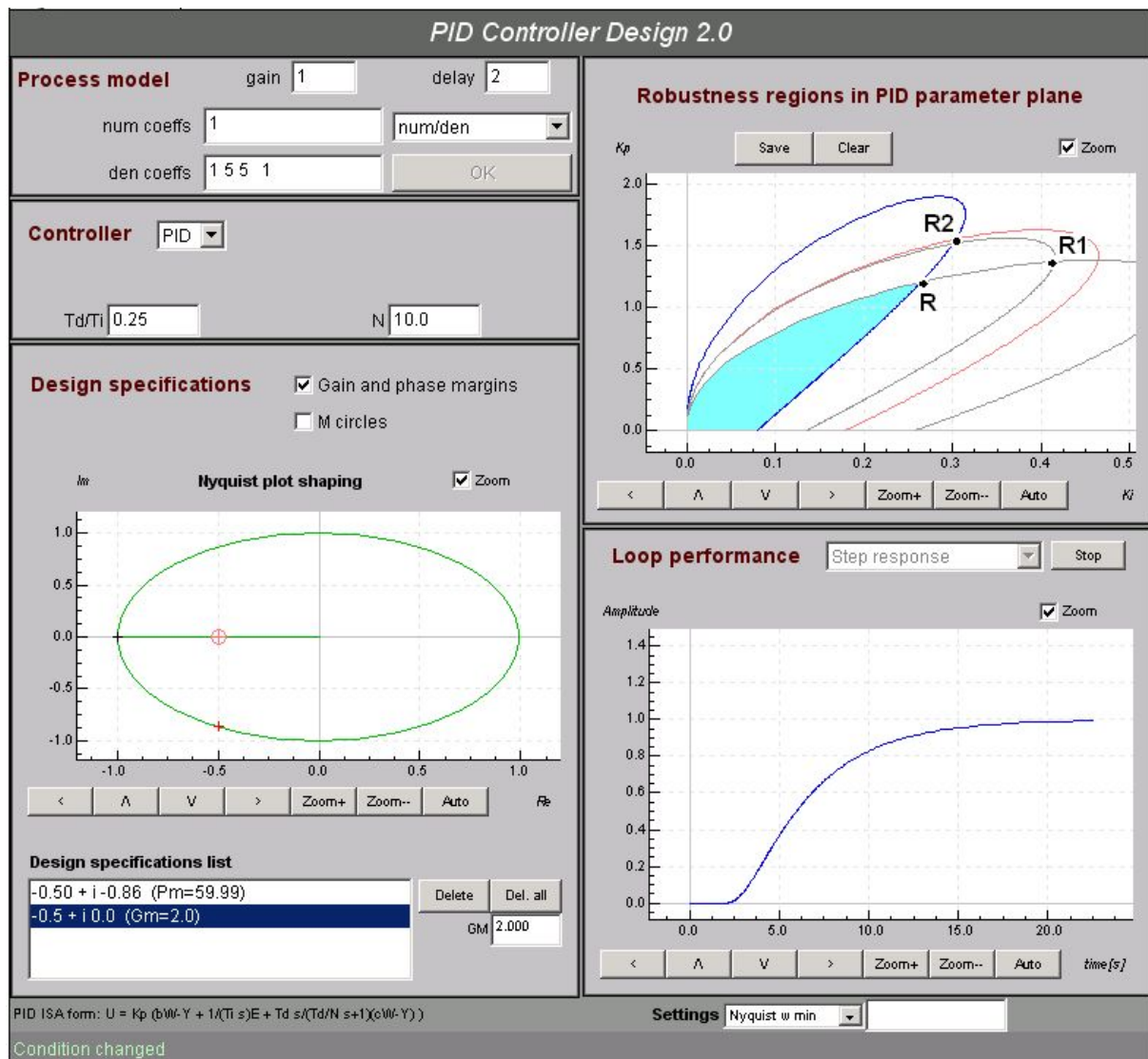
We want to control both processes by one robust controller. The minimum phase margin  $Pm = 60^\circ$  and minimum gain margin  $Gm = 2$  is required for both processes. This problem can be easily solved by the applet in following steps.

1) Define new process  $F_1(s)$  and paint two regions for required  $Gm$  and  $Pm$ .



2) Press the **Save** button – the regions are saved for further usage.

3) Define new process  $F_2(s)$  and paint two regions for required  $Gm$  and  $Pm$ .



The optimal parameters for process  $F_1(s)$  are represented by point **R1** (intersection of shadow regions).

The optimal parameters for process  $F_2(s)$  are represented by point **R2** (intersection of the blue and the red region). The area where  $Gm$  and  $Pm$  requirements are satisfied for both processes is light blue colored. From all possible points, we choose the optimal one – **R** (with maximal  $K_i$  coordinate [1]).

Finally, we can decrease the value of  $b$  to reduce the overshoot and revise the closed loop responses.

For more processes, we proceed by analogy. We must press the **SAVE** button before each new process is defined.

[1] PID controller design on Internet: [www.PIDlab.com](http://www.PIDlab.com)