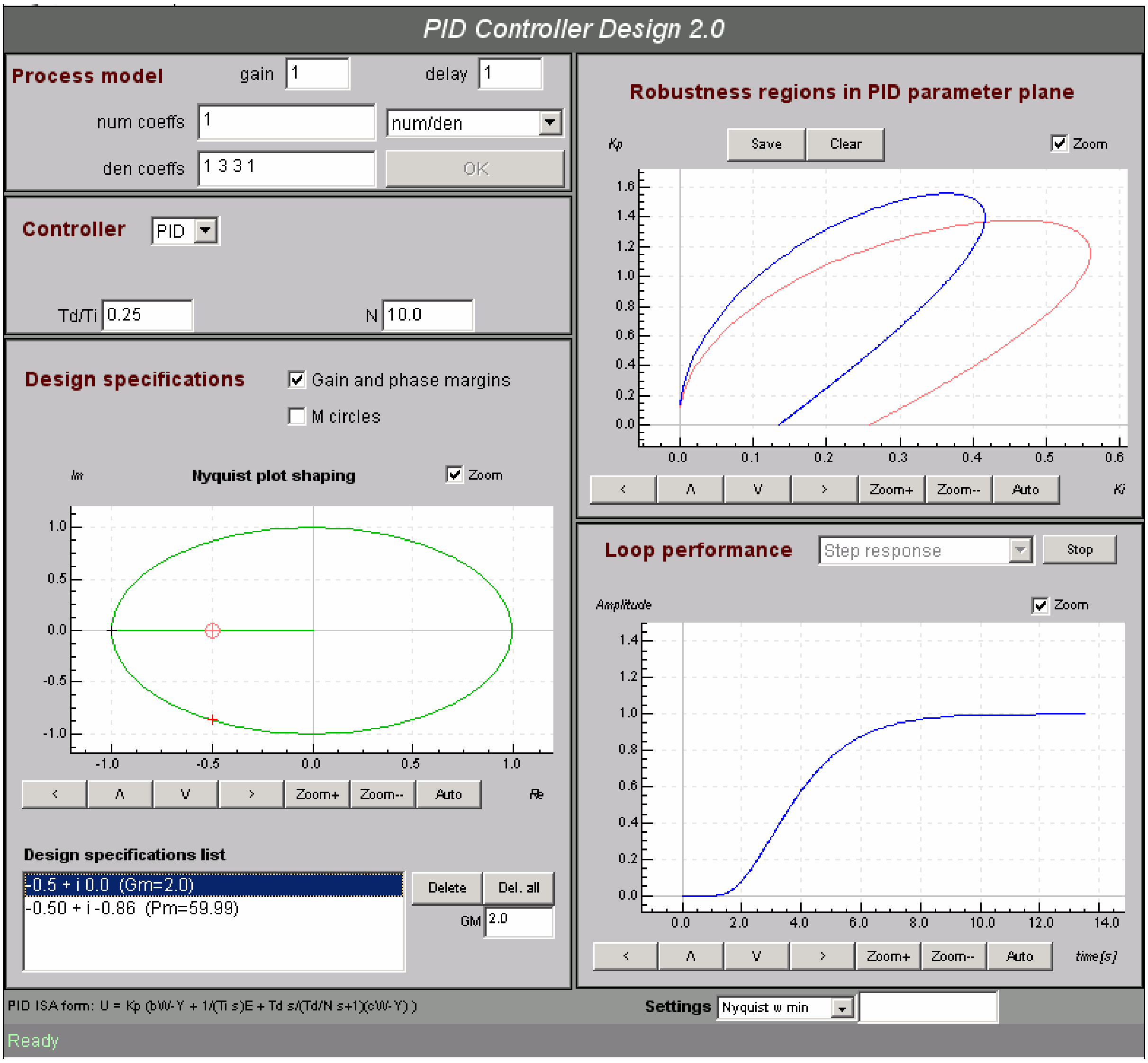
Robust controller design for more processes using applet www.PIDlab.com

Let us assume two processes described by transfer functions

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

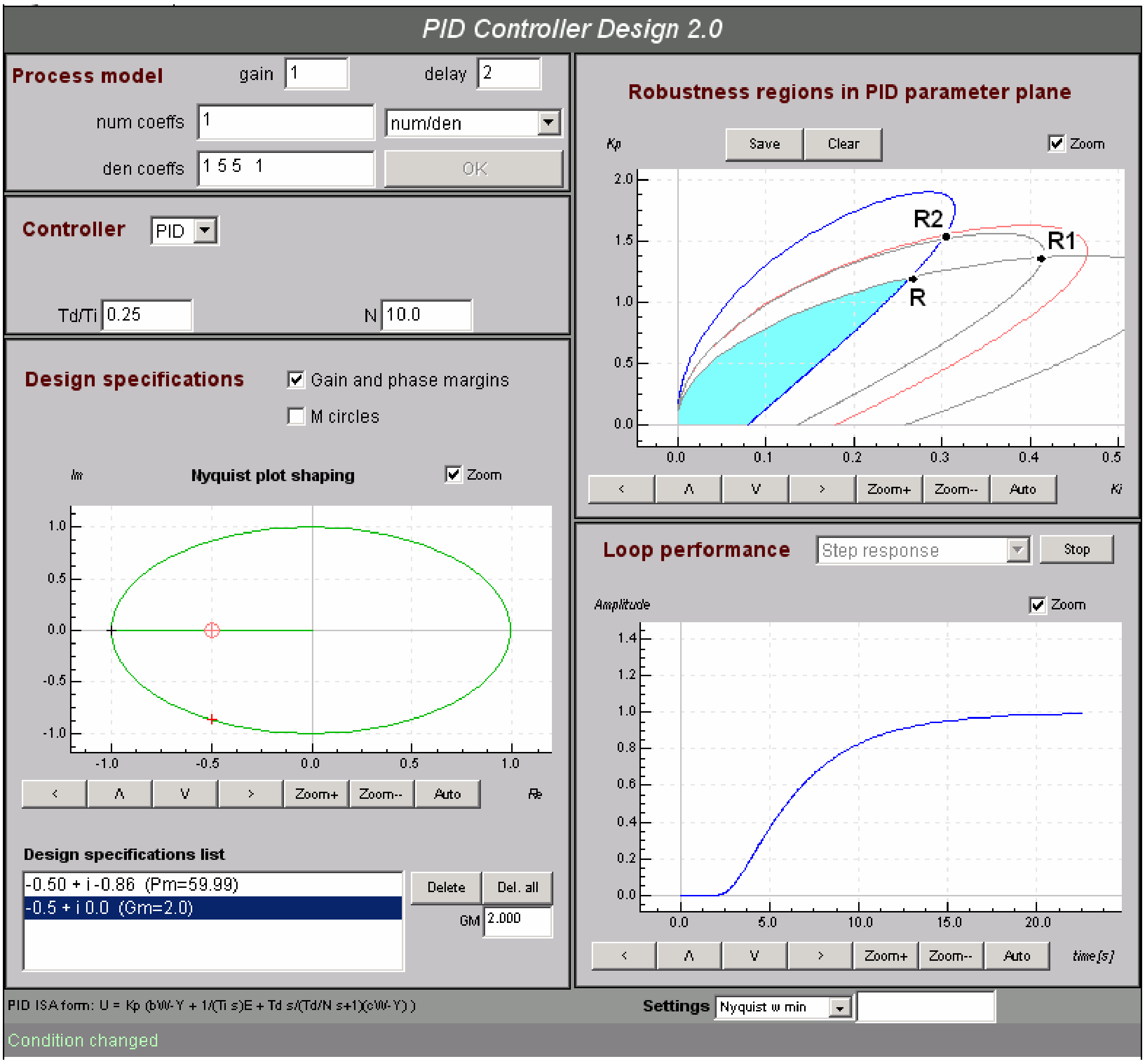
We want to control both processes by one robust controller. The minimum phase margin *Pm* = 60° and minimum gain margin *Gm* = 2 is required for both processes. This problem can be easily solved by the applet in following steps.

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 *Ki* coordinate [1]).

Finally, we can decrease the value of *b* to reduce the overshot 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 Interner: www.PIDlab.com