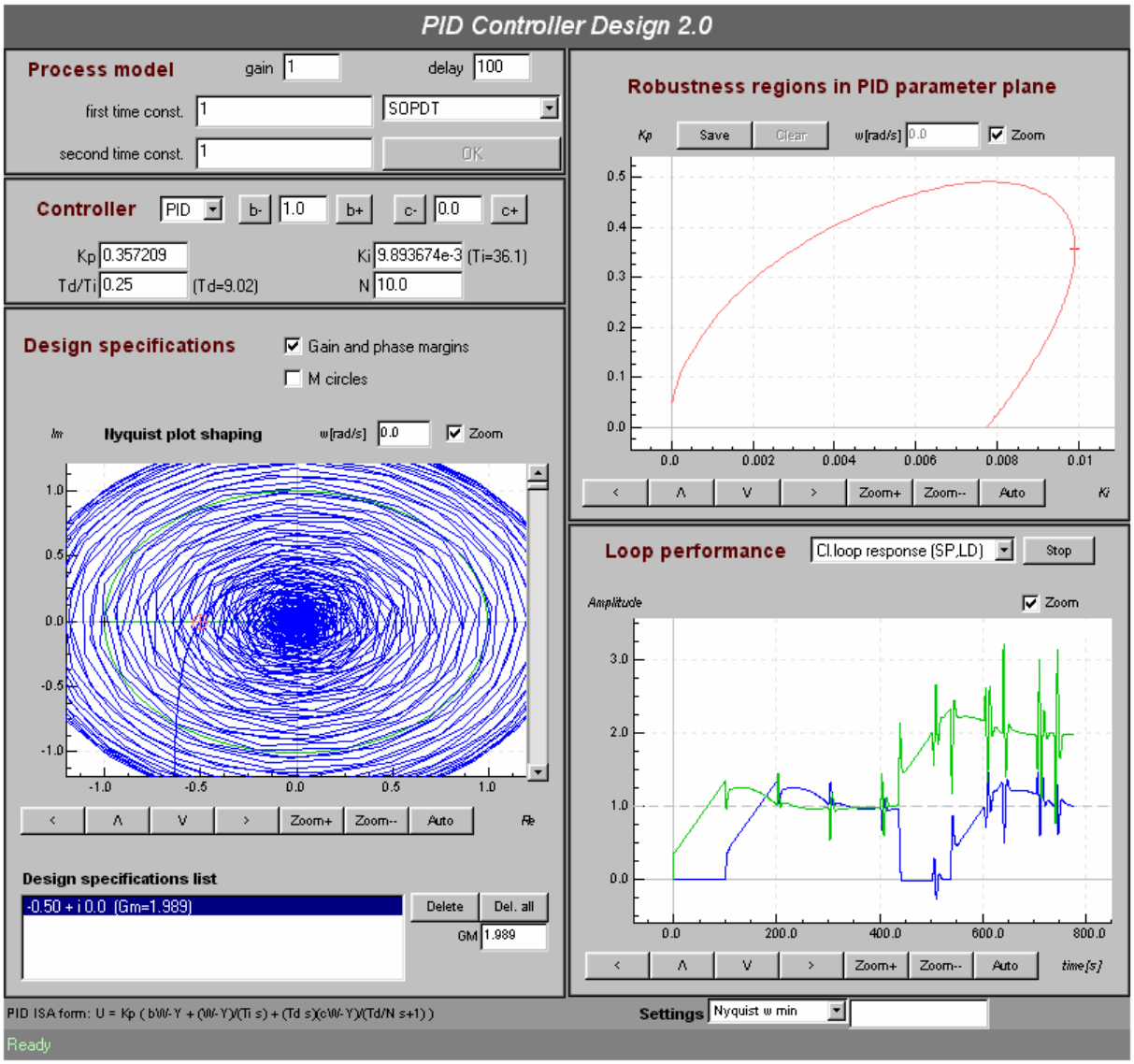
PID controller design for systems with significant dead time using applet www.PIDlab.com

Consider the process with significant dead time described by transfer function

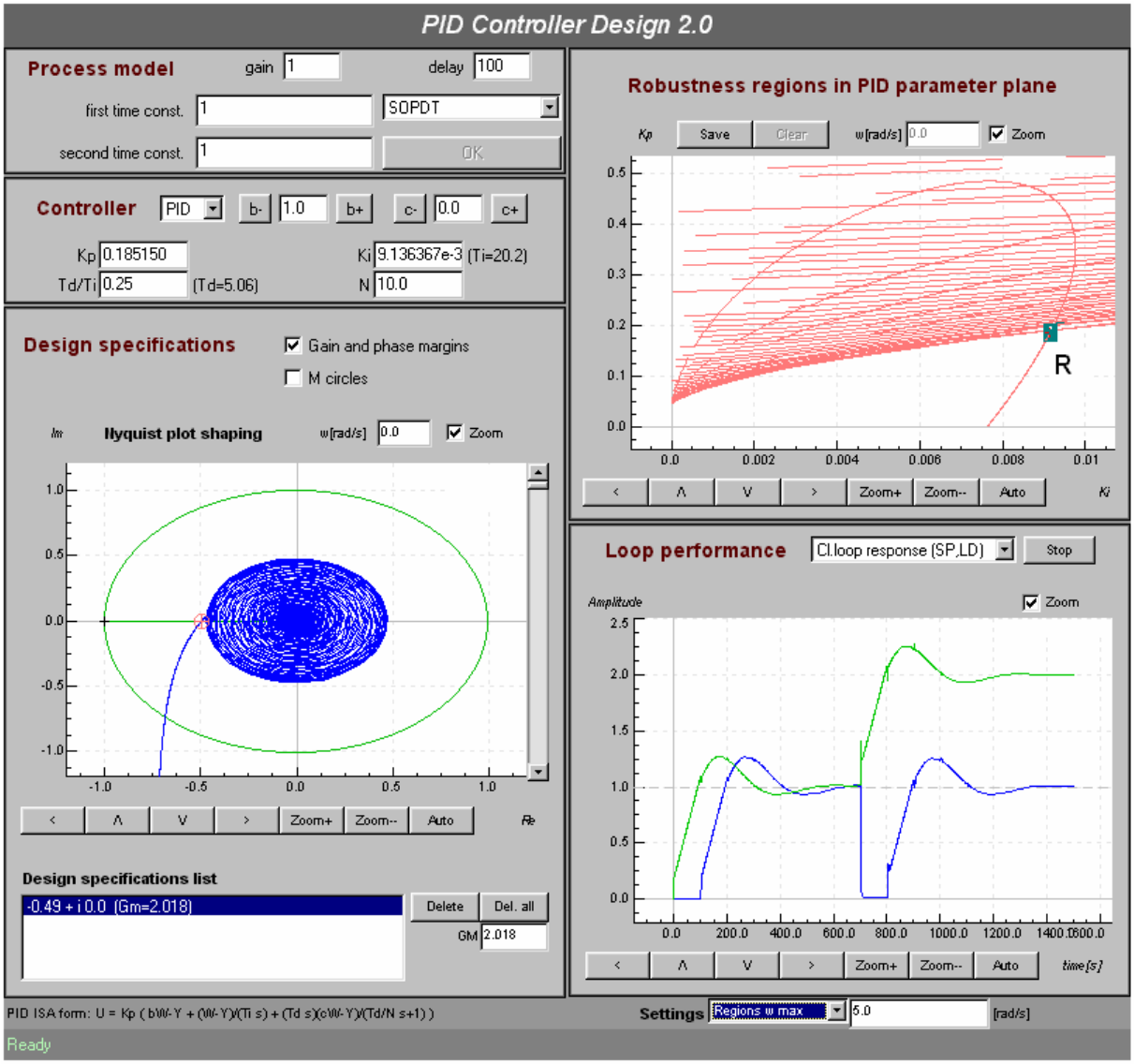
$$F(s) = \frac{e^{-100s}}{(s+1)^2}.$$

If we want for example to satisfy the gain margin G_m=0.5, we obtain unstable closed loop using standard procedure described in [1].



The applet paints just the basic branch of the region (RP window) implicitly. The significant dead time could cause other important branches at higher frequencies. These branches restrict the admissible area for the PID parameters.

That's why it is necessary to change automatic frequency range in settings panel. By solving our example we choose Regions w max = 5 rad/sec. The further frequency increase does not affect the shape of admissible area.
Now, we can choose an optimal PID controller **R** to obtain the stable closed loop.



[1] PID controller design on Internet: www.PIDlab.com