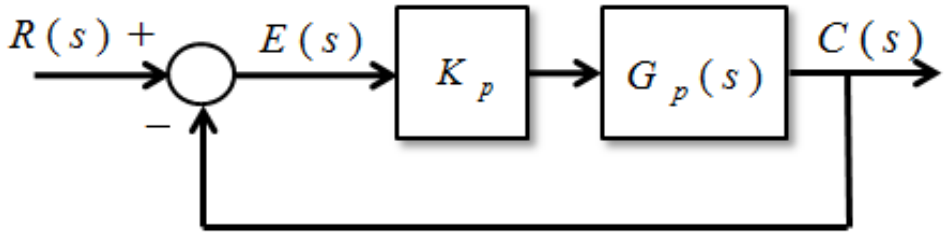
PSIM PID STUDY

박현우
phw820@naver.com

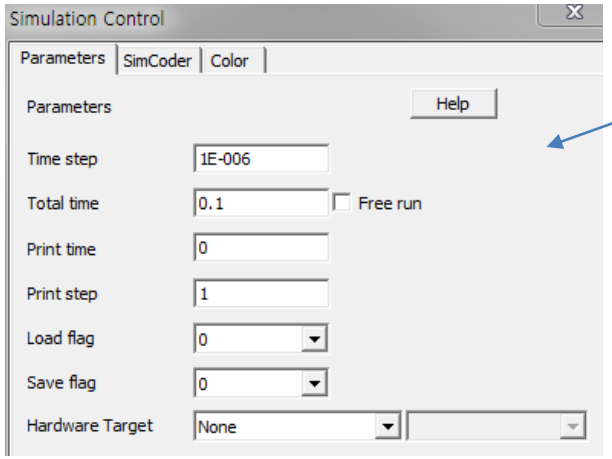
목차

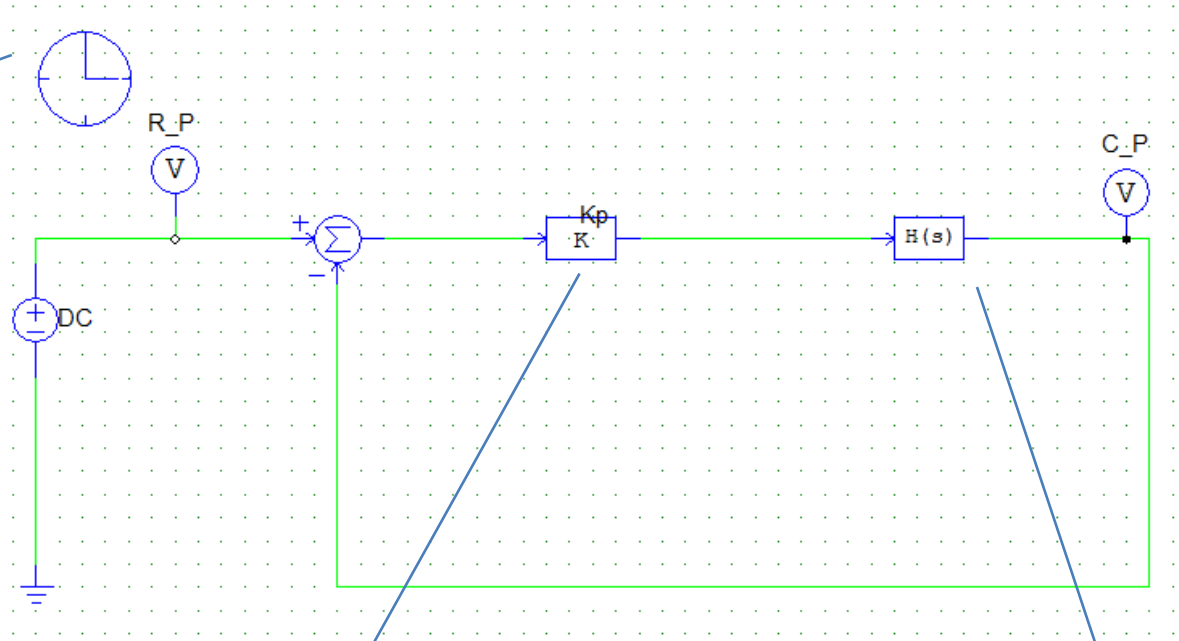
PSIM PID 제어

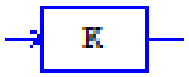
1) P 제어 이론



2) P 회로 설계







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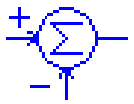
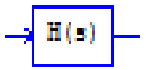


Summer (+/-)



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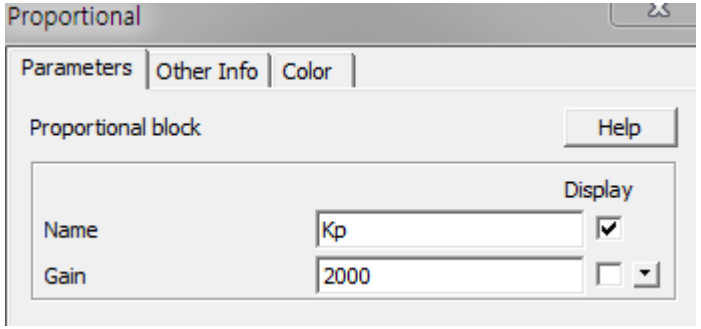
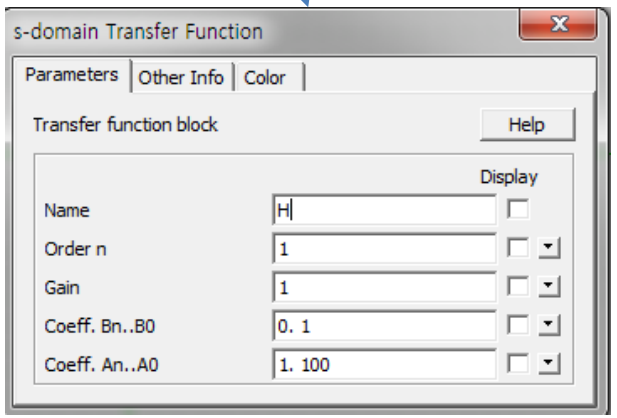
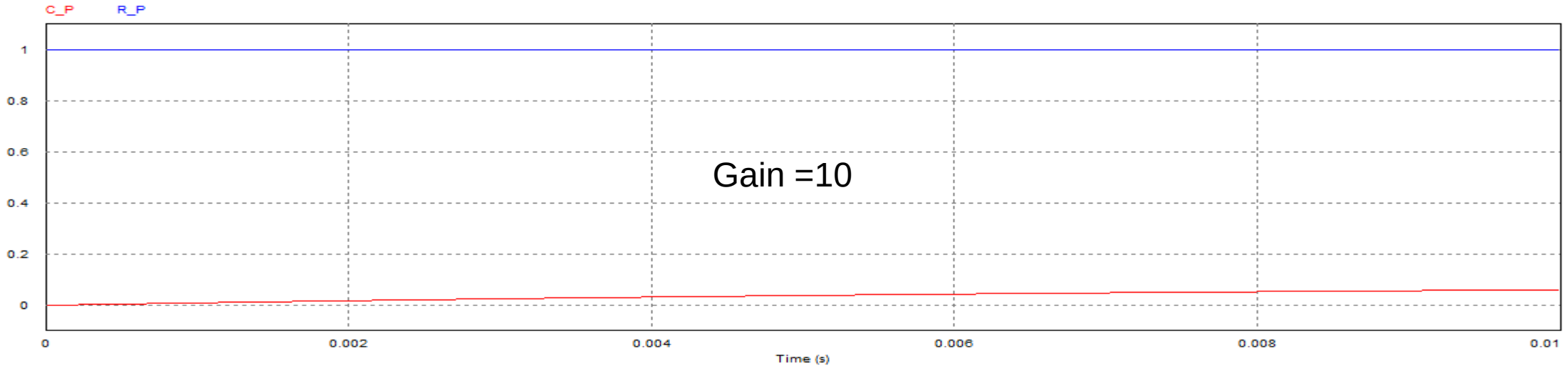
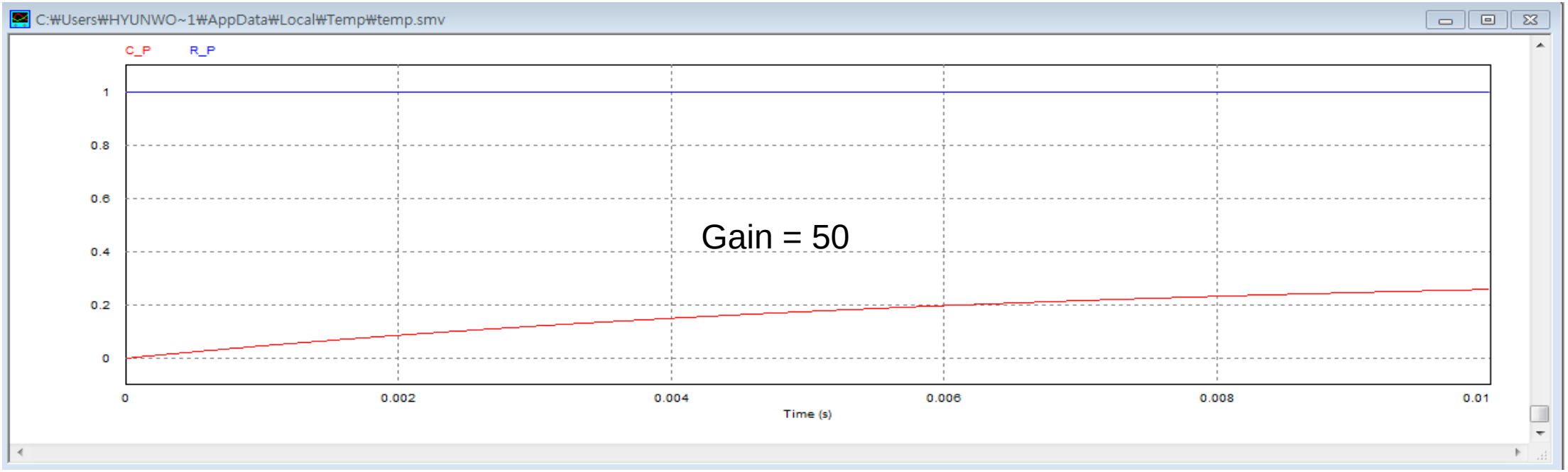


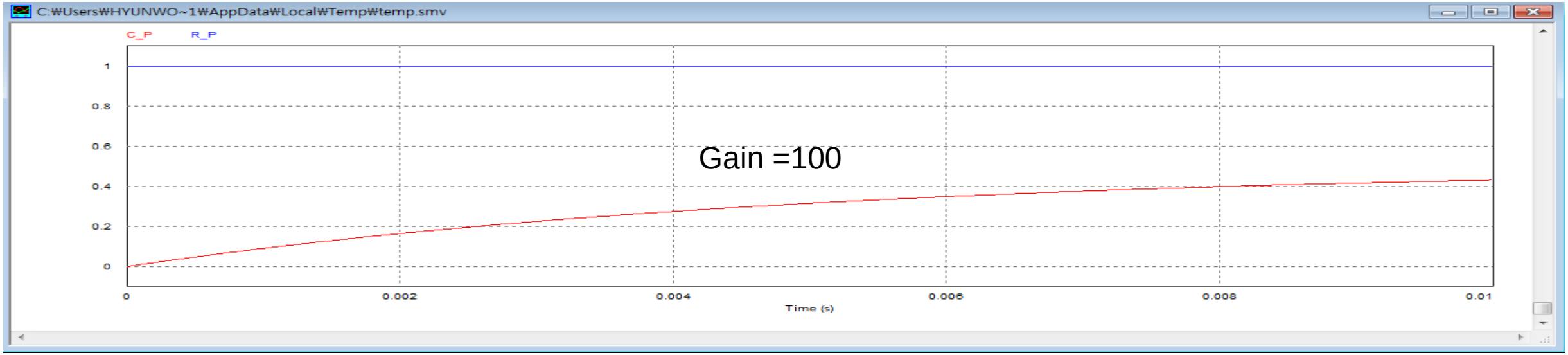


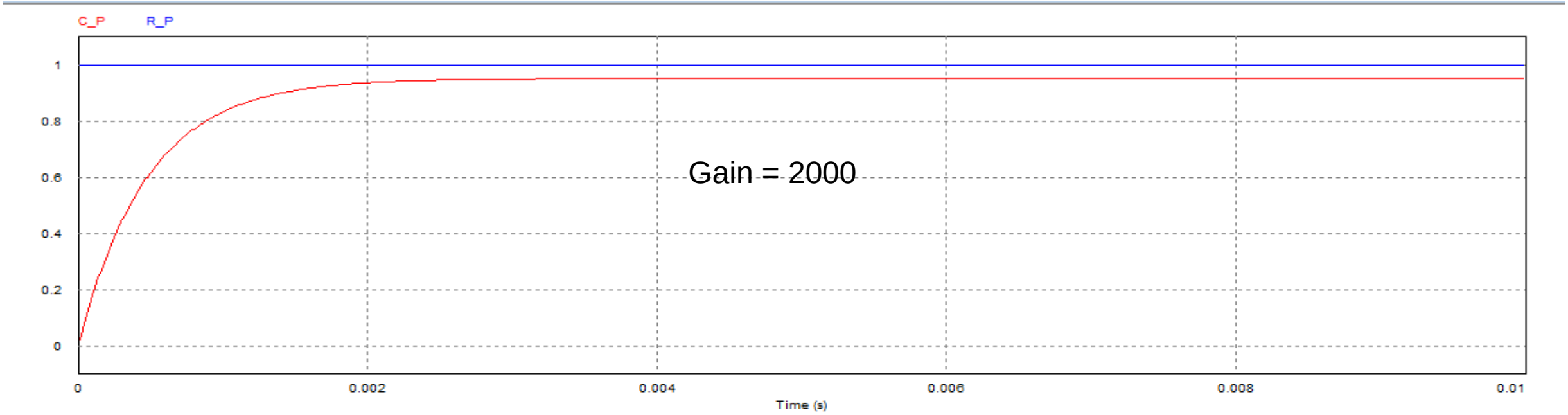
3) P 게인(Gain)에 따른 제어 변화



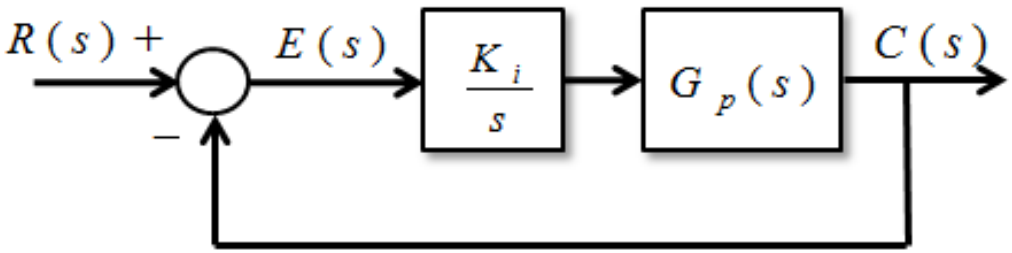


3) P 게인(Gain)에 따른 제어 변화

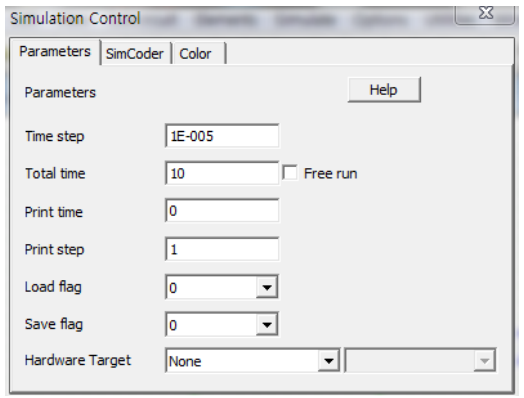




4) I 제어 이론



5) I 회로 설계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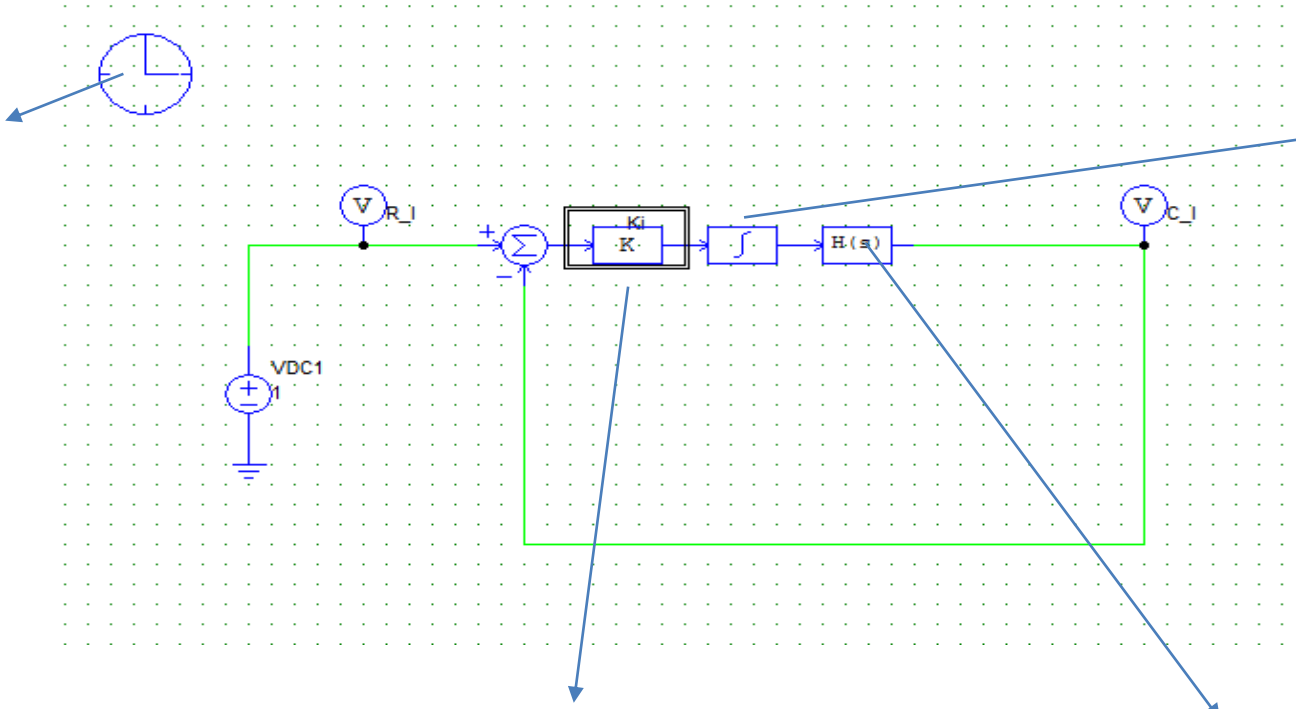
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R_I
Ki
K
∫
H(s)
V
C_I
VDC1
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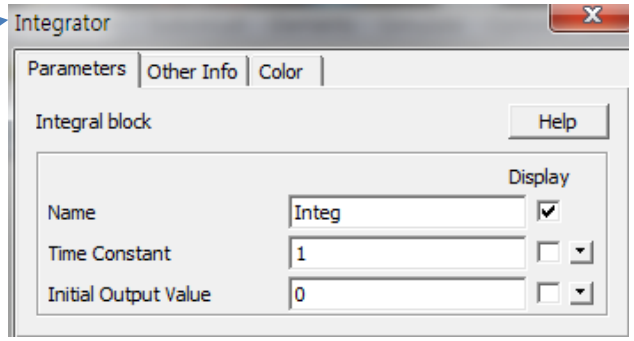
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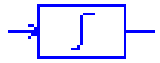
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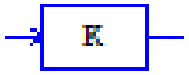
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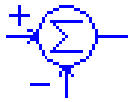
Proportional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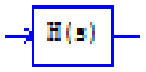
H(s)
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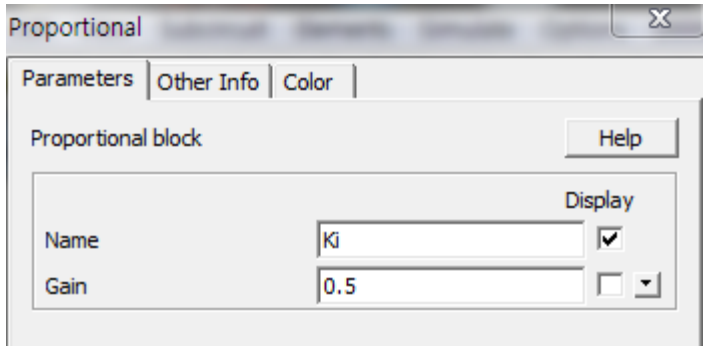
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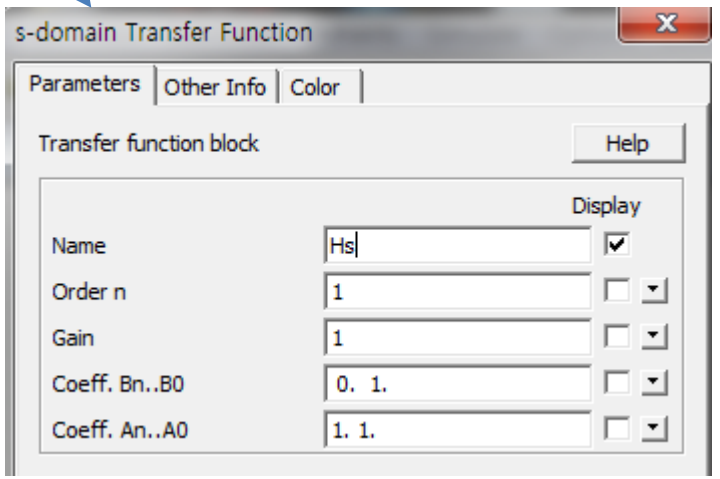
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Other Info
Color
Transfer function block
Help
Display
Name
Hs
Order n
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Gain
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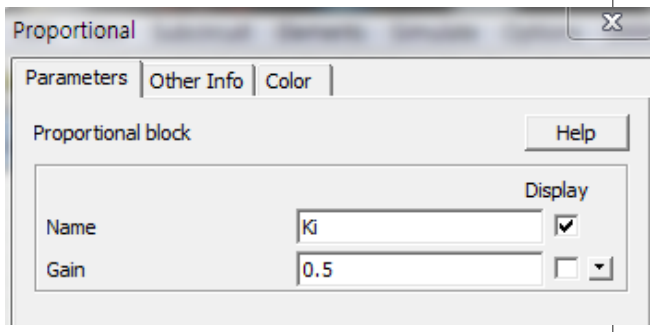
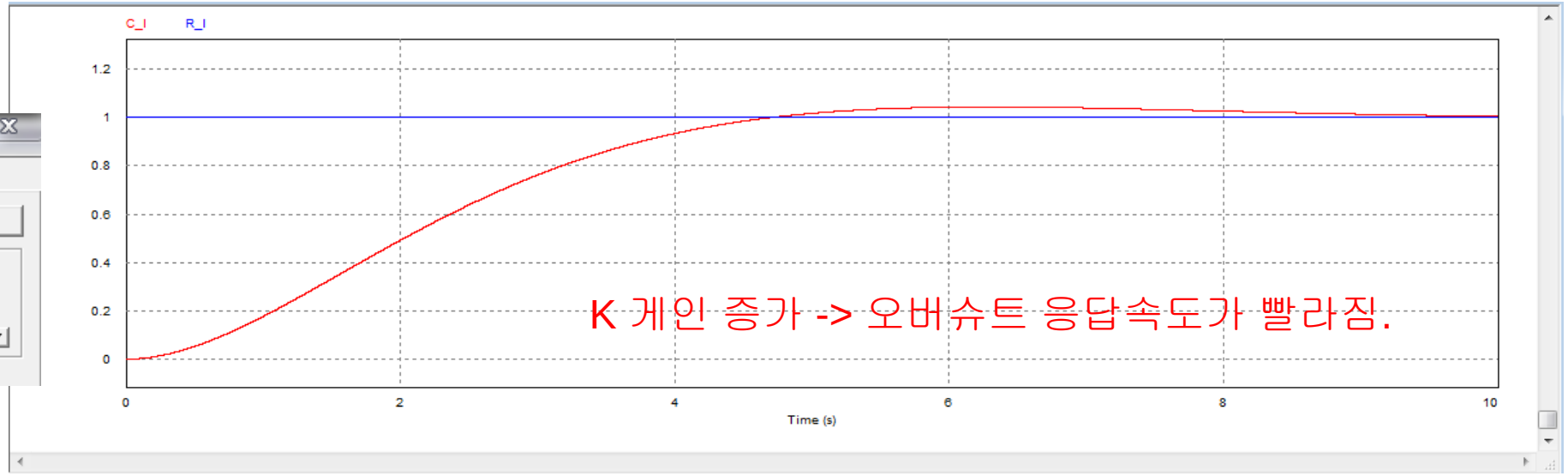
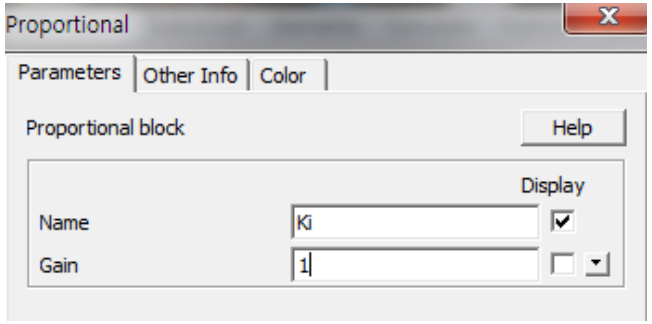
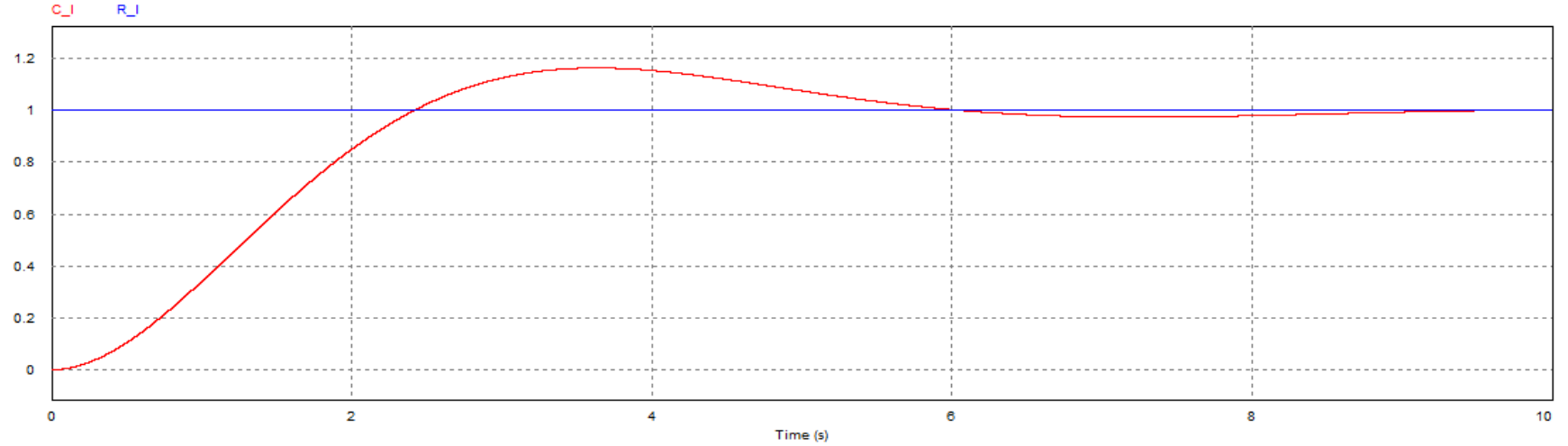
Coeff. Bn..B0
0. 1.
Coeff. An..A0
1. 1.

6) I 제어에 따른 정상상태 오차변화

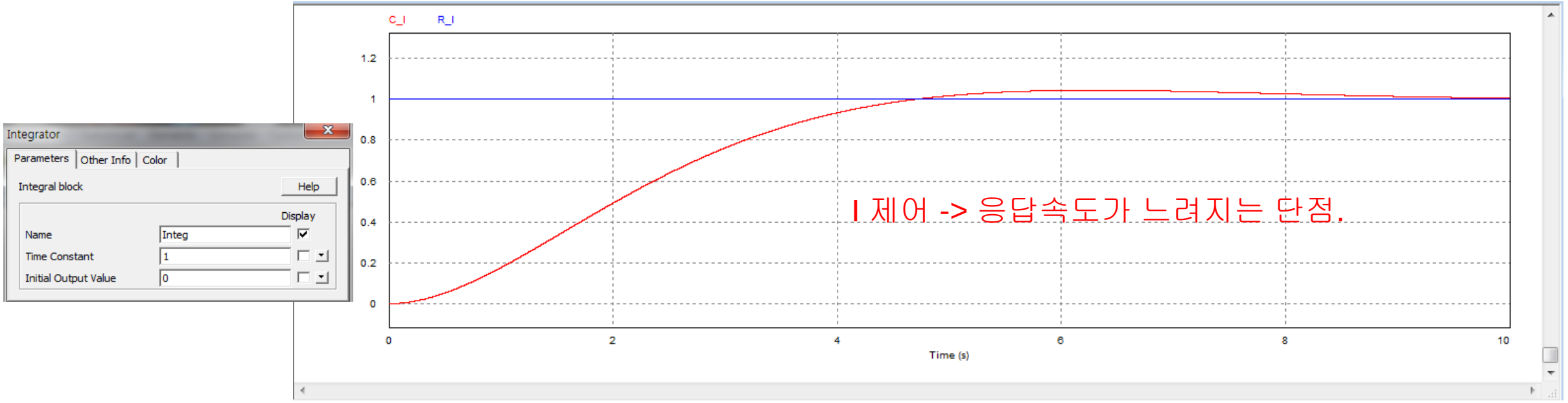


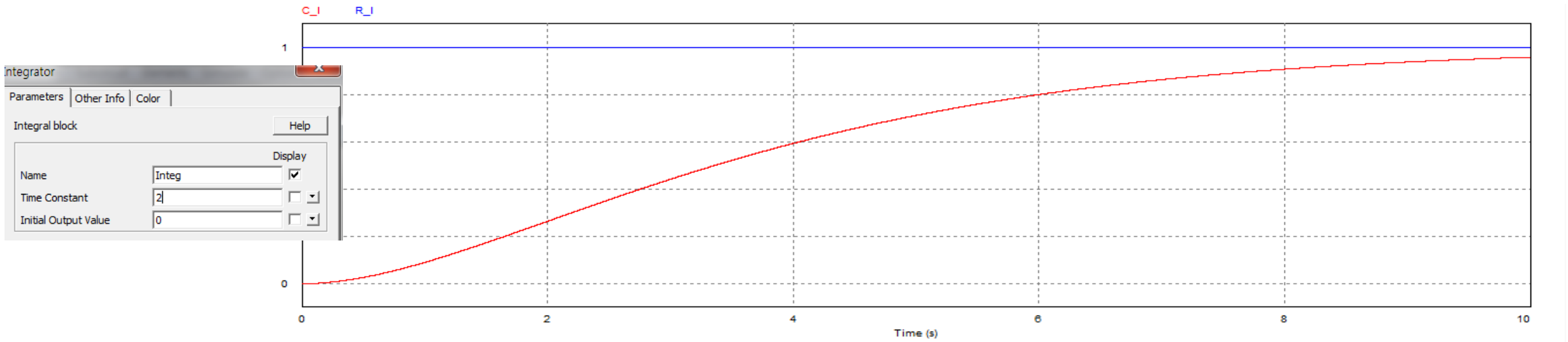




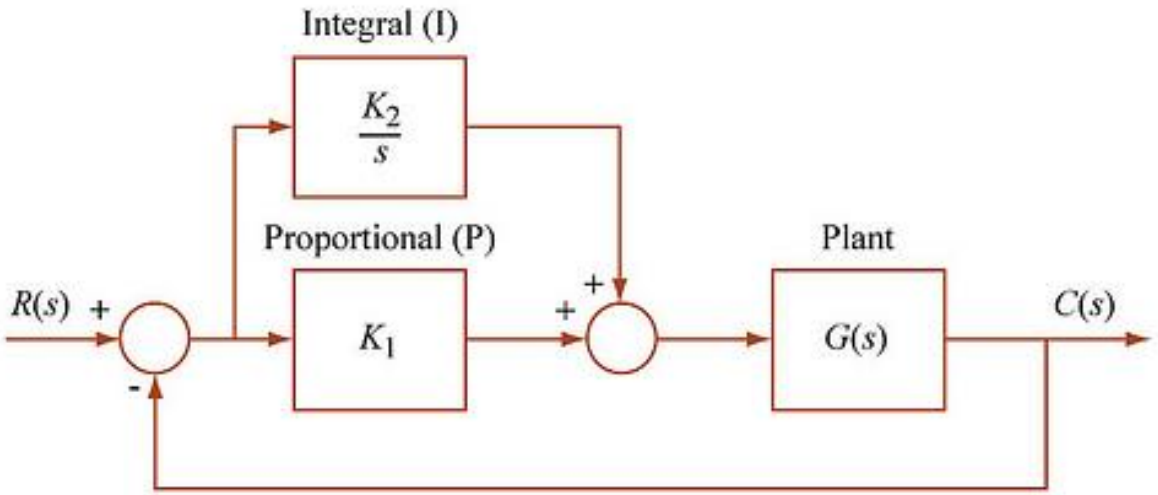


6) I 제어에 따른 정상상태 오차변화

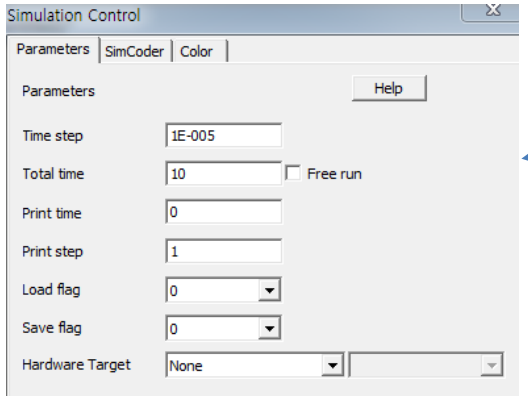




7) PI 제어 특징



8) PI 회로 설계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Color
Parameters
Help
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Total time
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Free run
Print time
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Load flag
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Save flag
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Hardware Target
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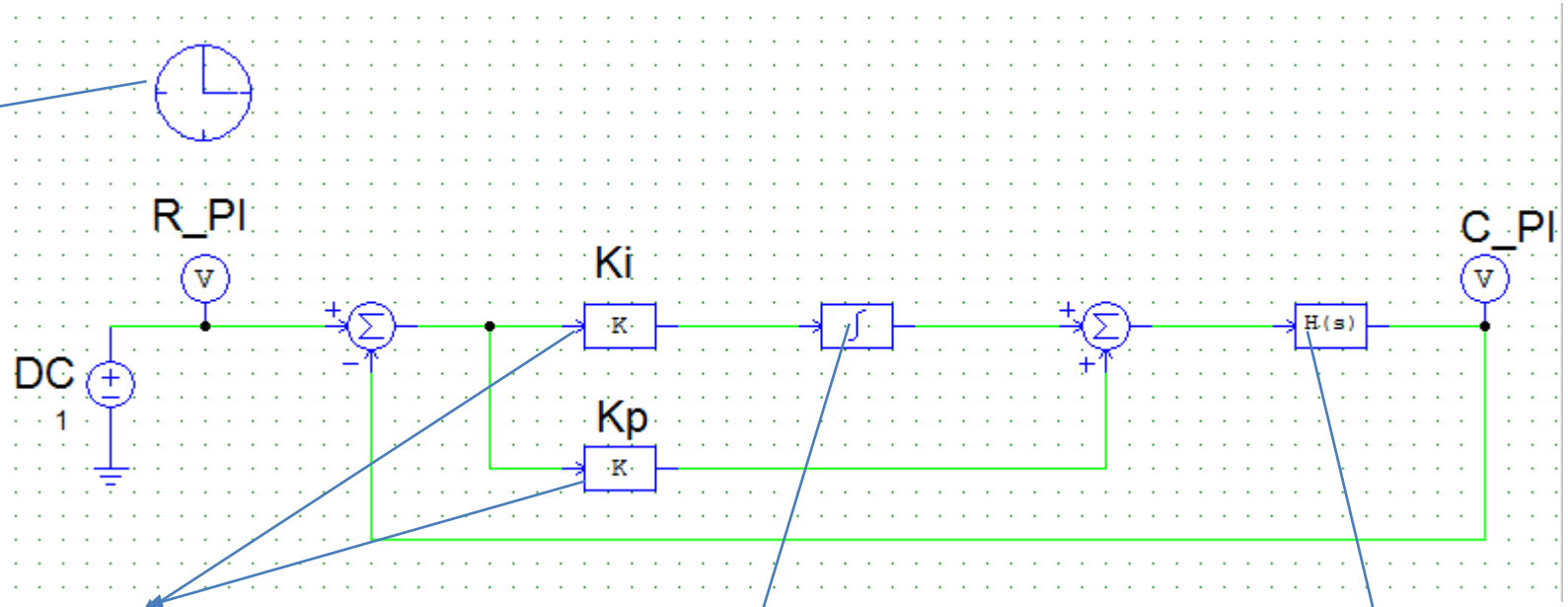
R_PI
V
DC
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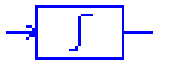
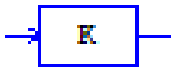
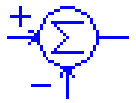
Ki
K
Kp
K
H(s)
C_PI
V


Summer (+/+)


Integrator


K
Proportional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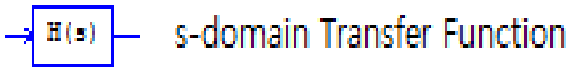
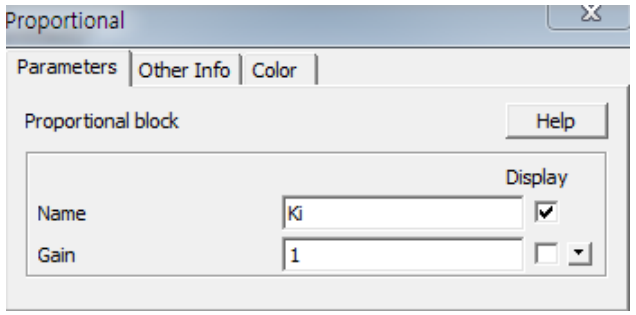

H(s)
s-domain Transfer Function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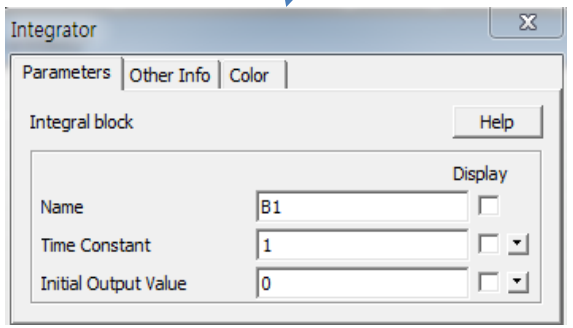
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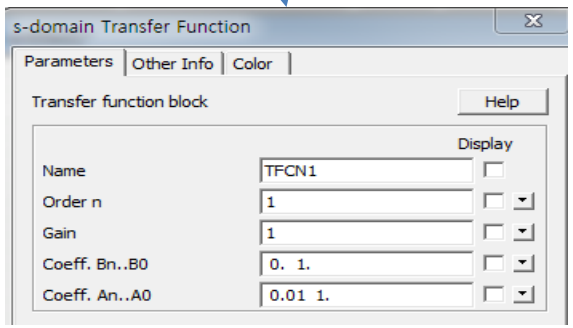
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Transfer function block
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Gain
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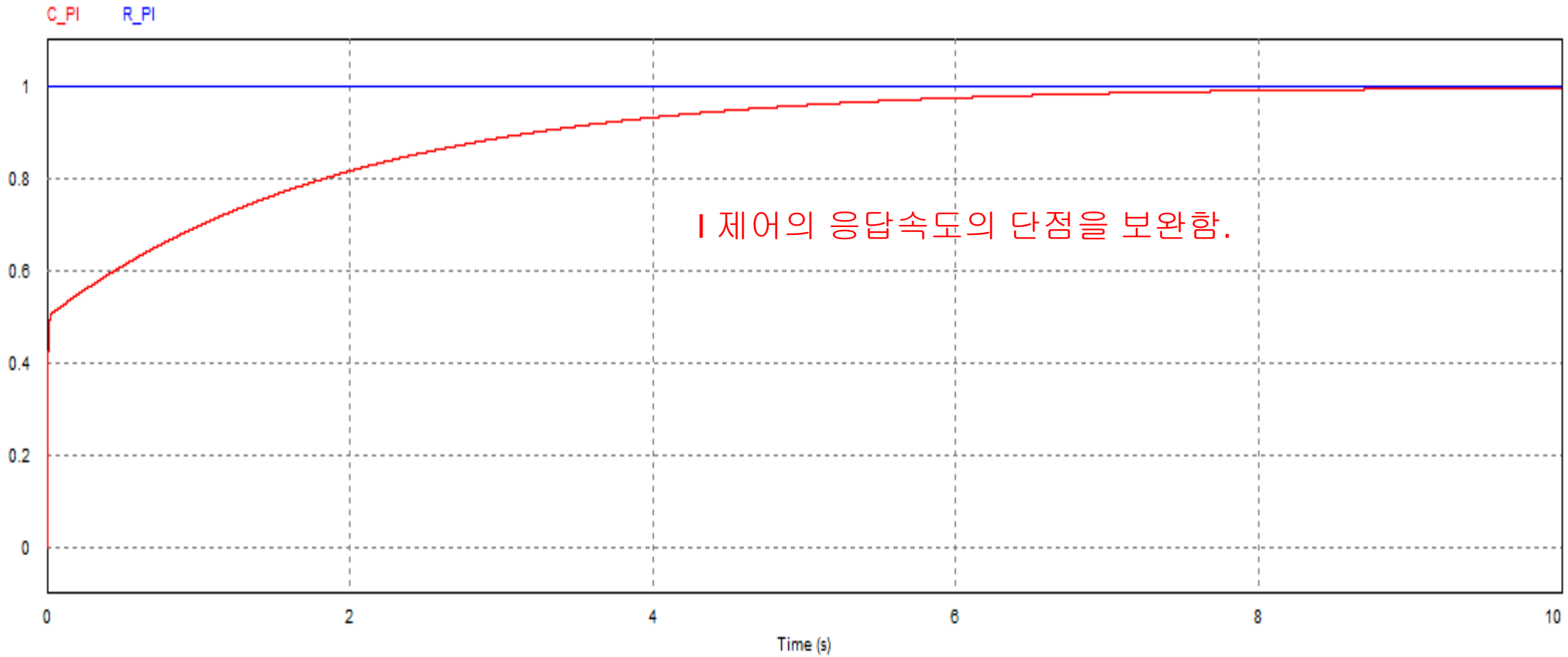
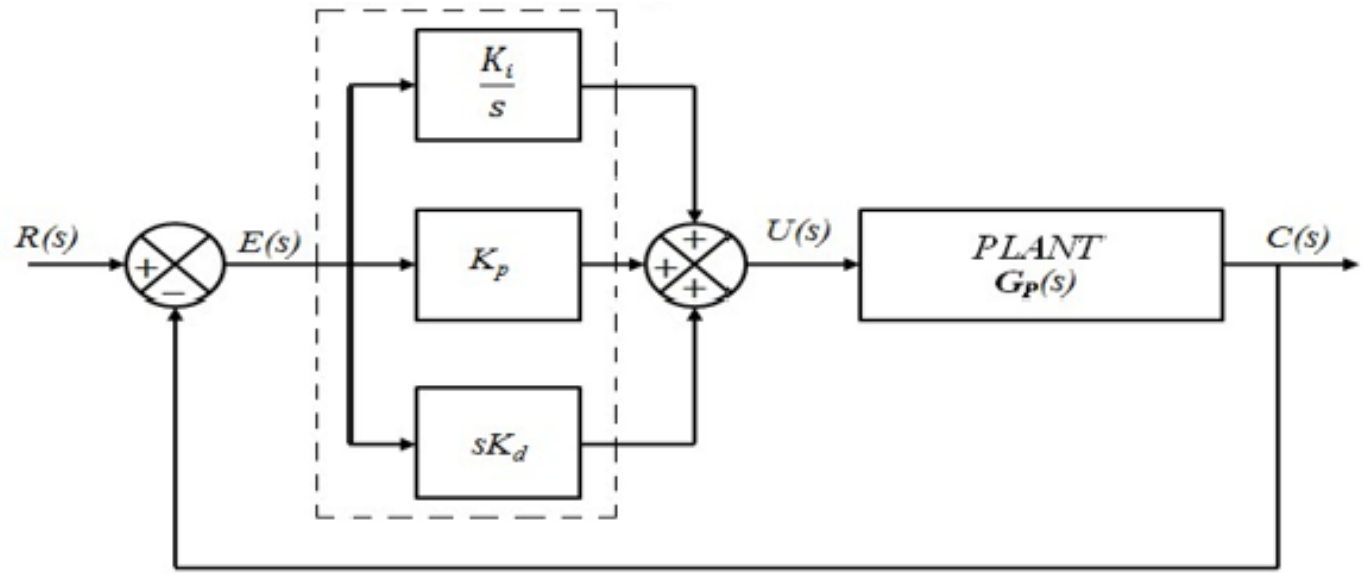
0. 1.
Coeff. An..A0
0.01 1.

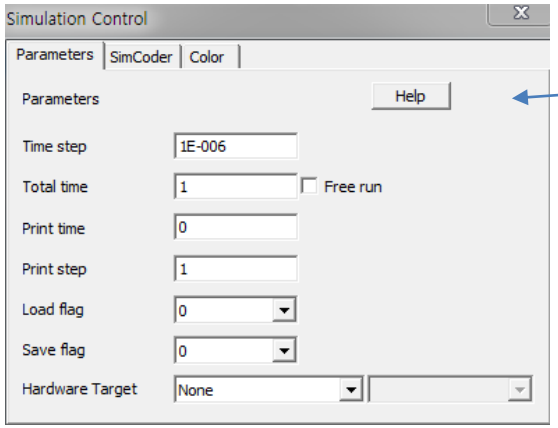
9) PI 제어에 따른 반응속도와 정상상태 오차 변화

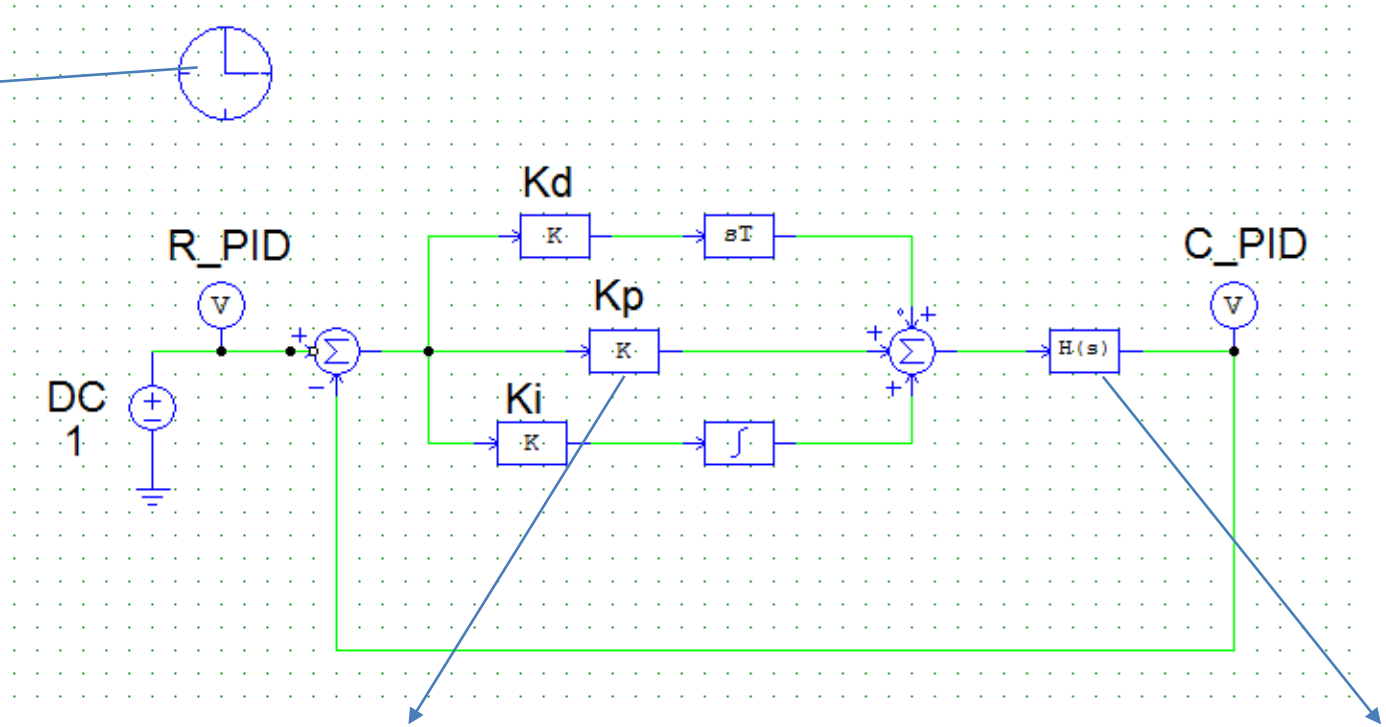


10) PID 제어 특징



11) PID 회로 설계

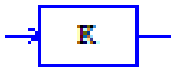




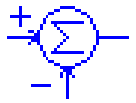
Differentiator

Summer (3-input)

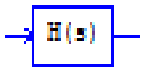
Integrator



Proportional



Summer (+/-)



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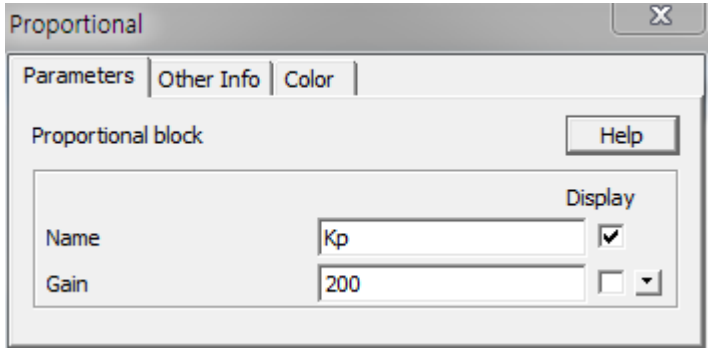
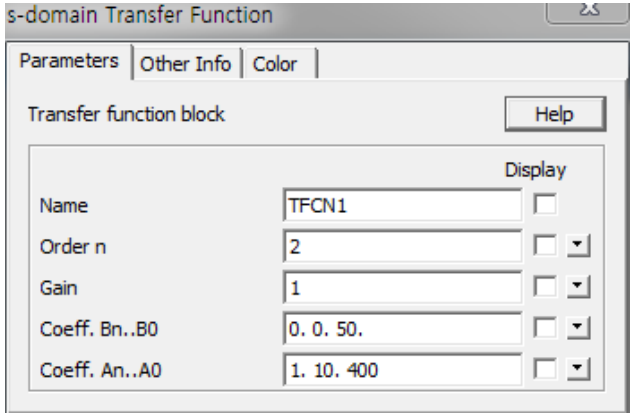
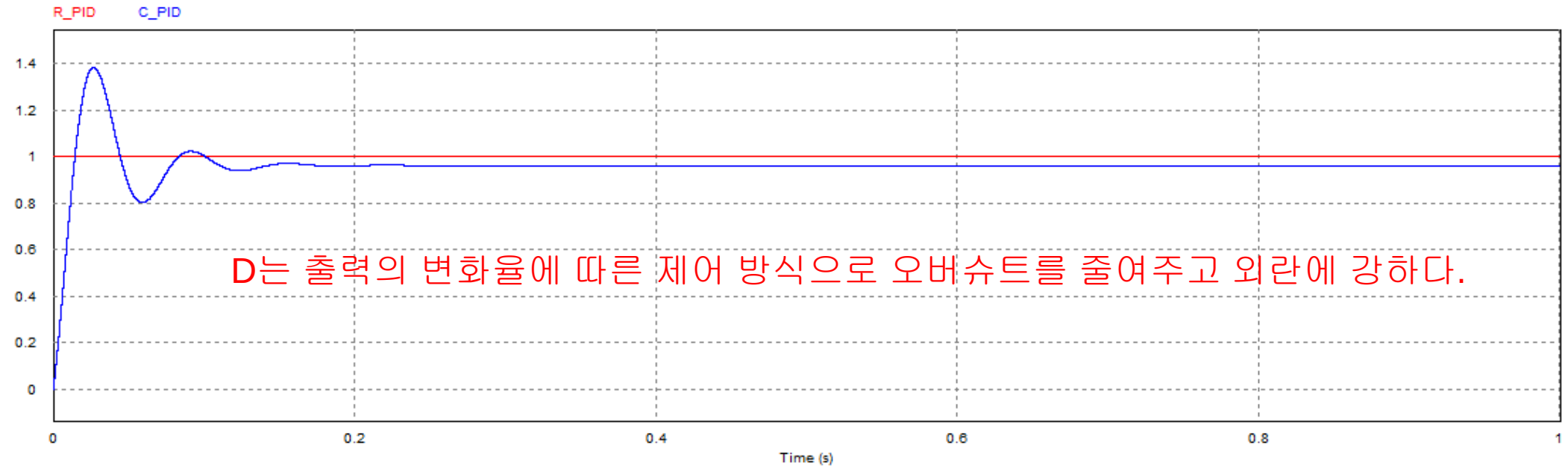




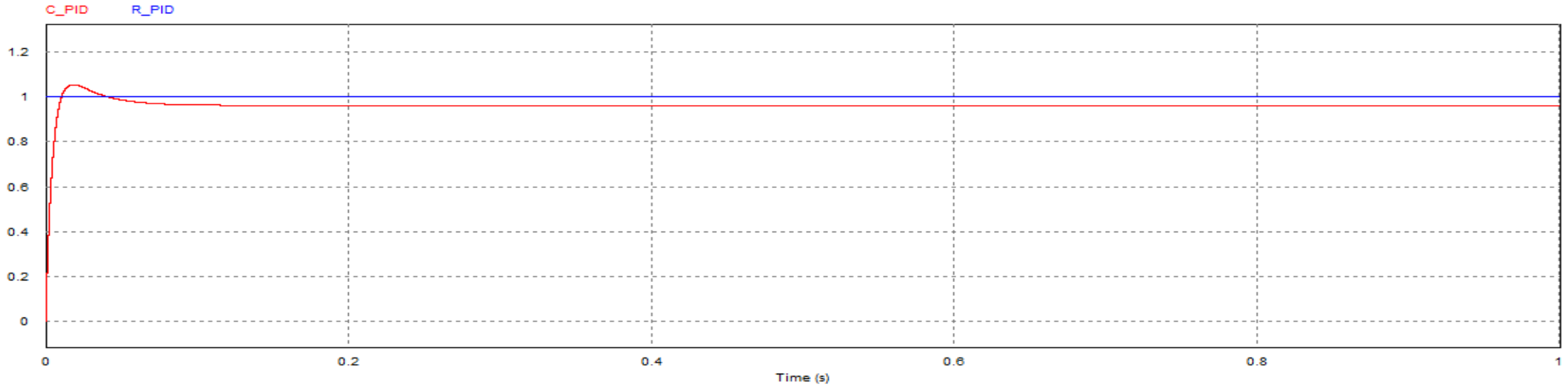
12) PID 제어에 따른 오버슈트, 반응속도와 정상상태 오차 변화

Name Kd
Gain 1

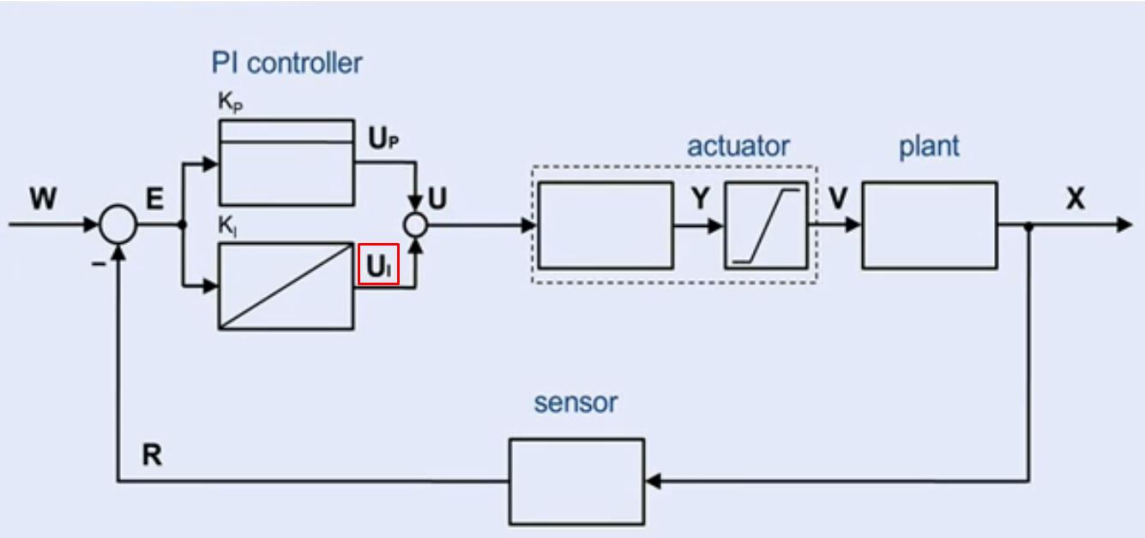


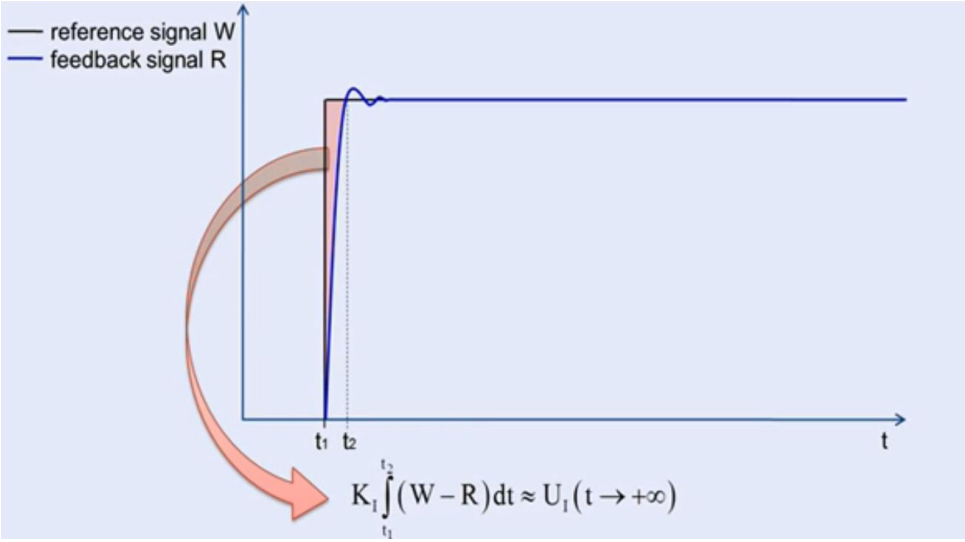
D는 출력의 변화율에 따른 제어 방식으로 오버슈트를 줄여주고 외란에 강하다.

Name Kd
Gain 5



12) I 제어시 반드시 필요한 Anti-Windup 1

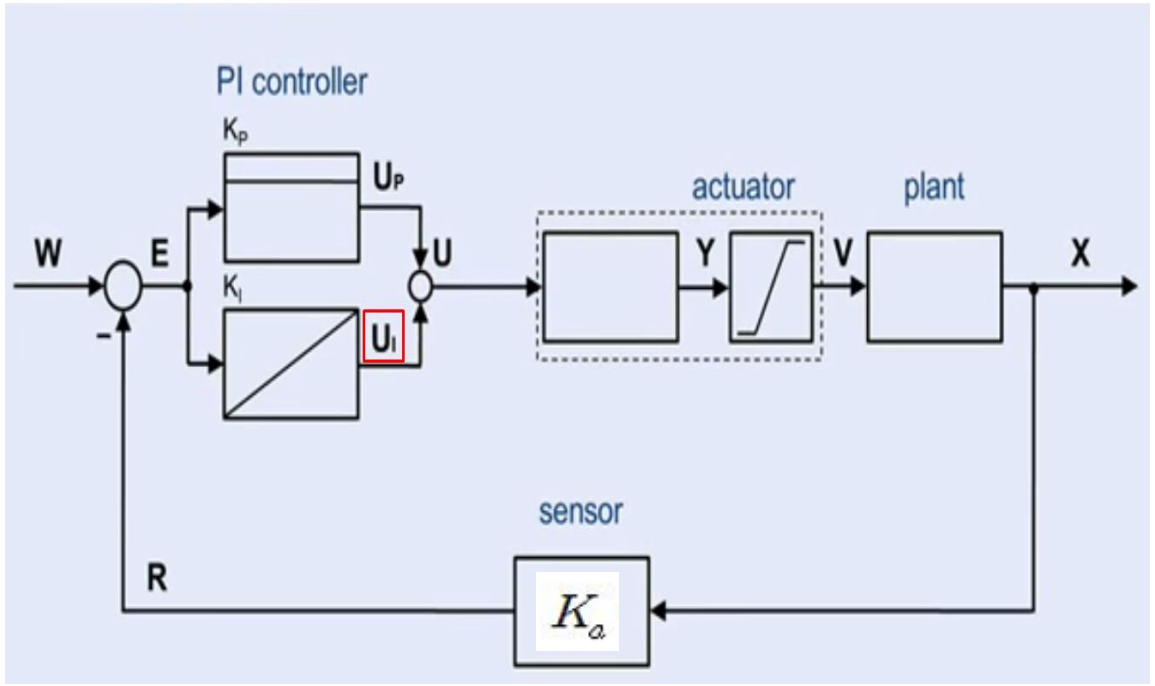


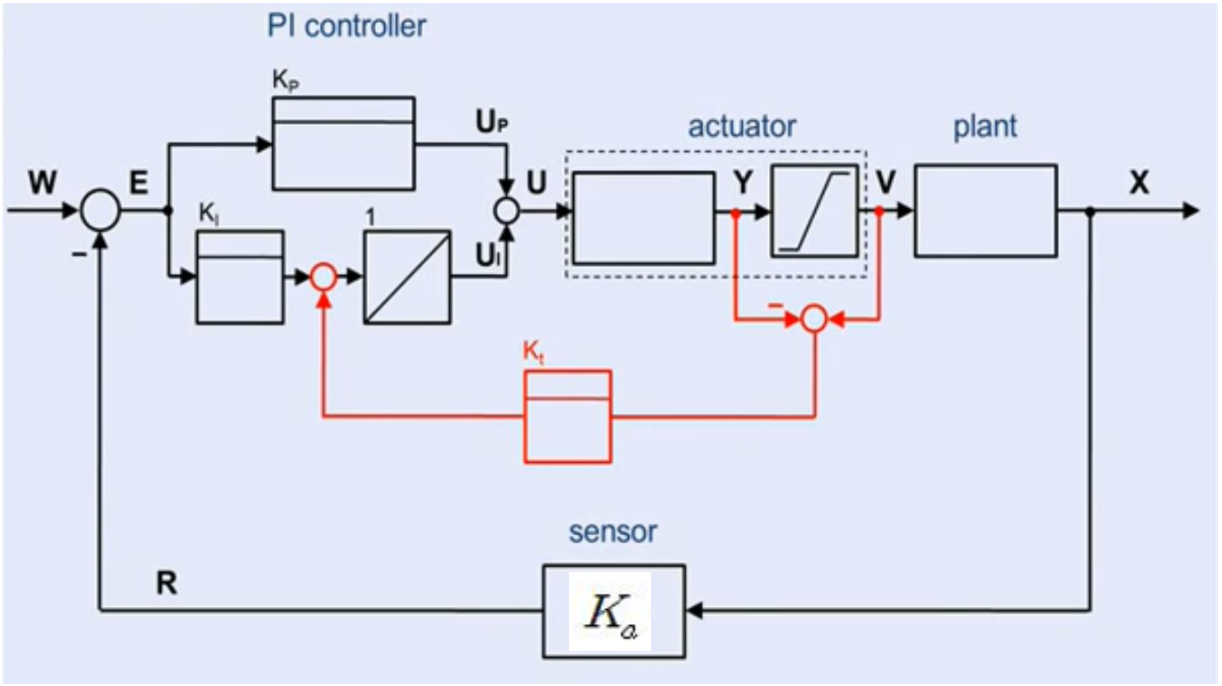


in steady state: $E(t \to +\infty)=0$

$$\Rightarrow U(t \to +\infty) = U_I(t \to +\infty)$$

12) I 제어시 반드시 필요한 Anti-Windup 2



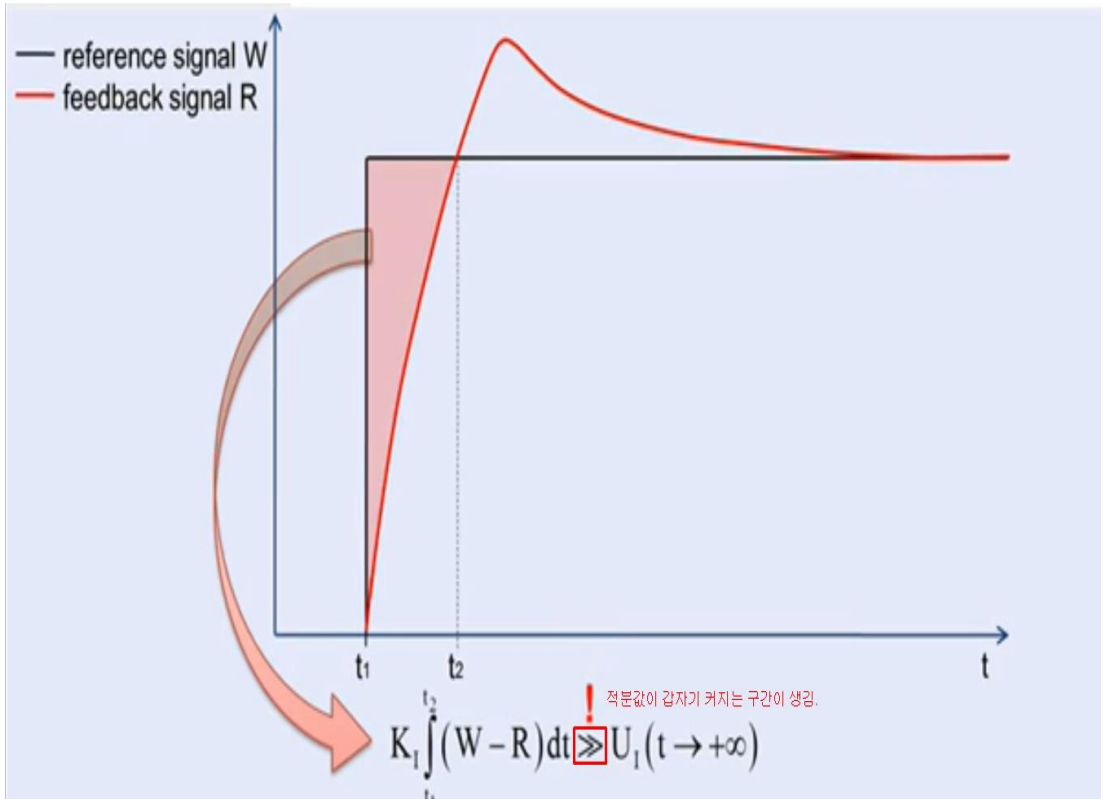


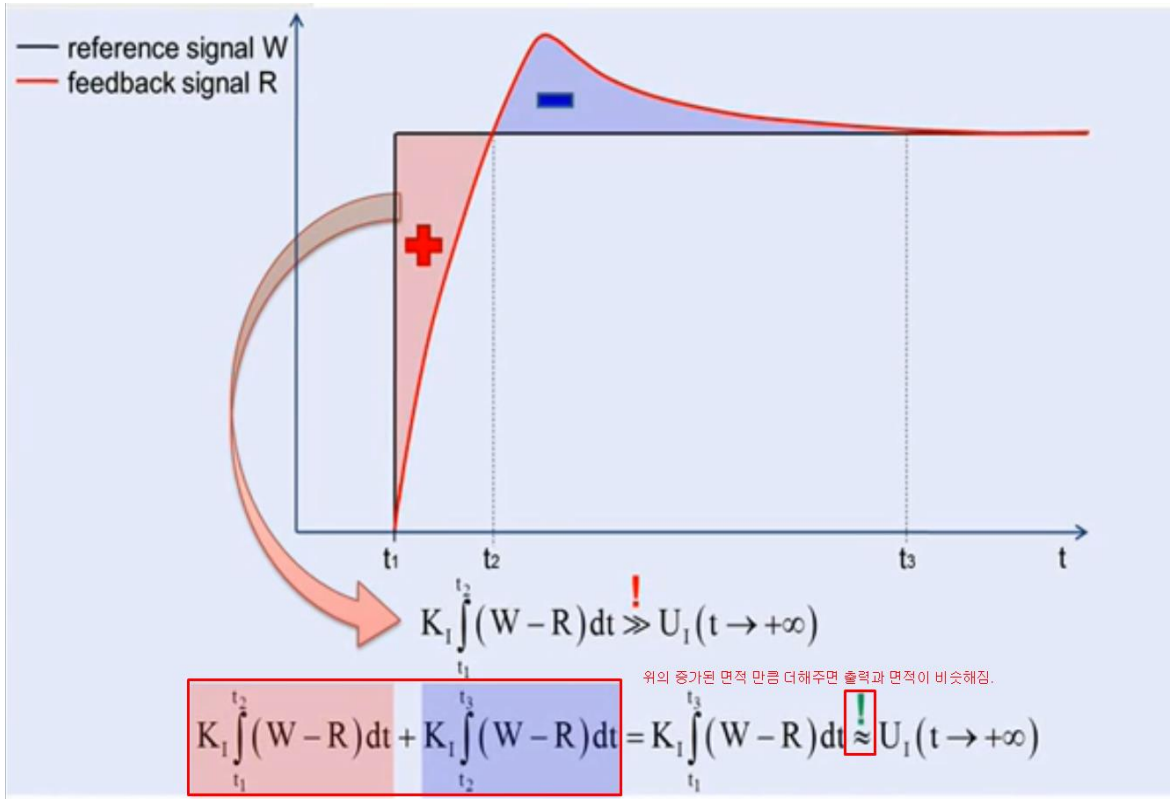
대략적인 적정범위

$$K_a = \frac{1}{K_p}$$

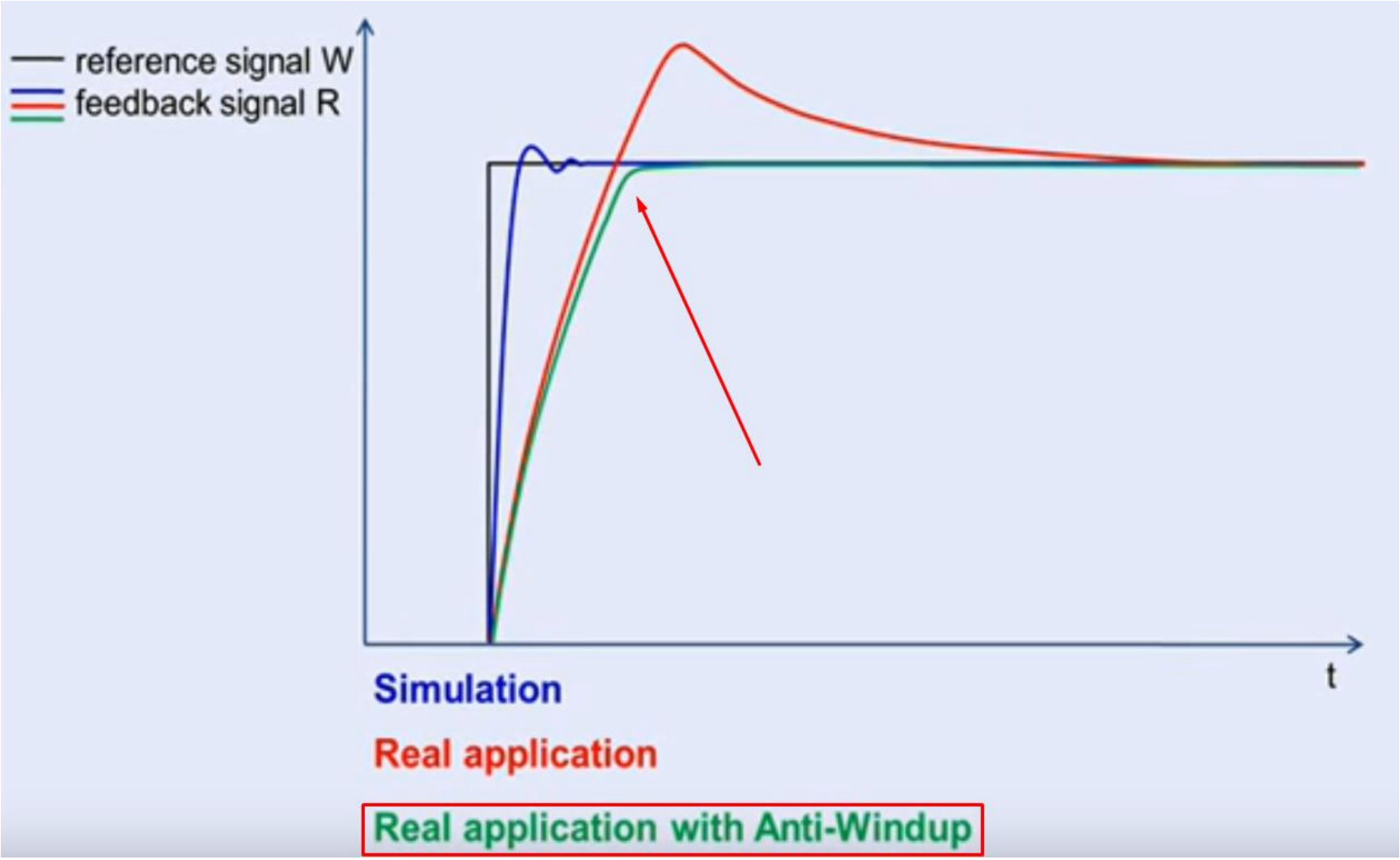
$$\frac{1}{3}\frac{1}{K_p} < K_a < \frac{3}{K_p}$$

12) I 제어시 반드시 필요한 Anti-Windup 3

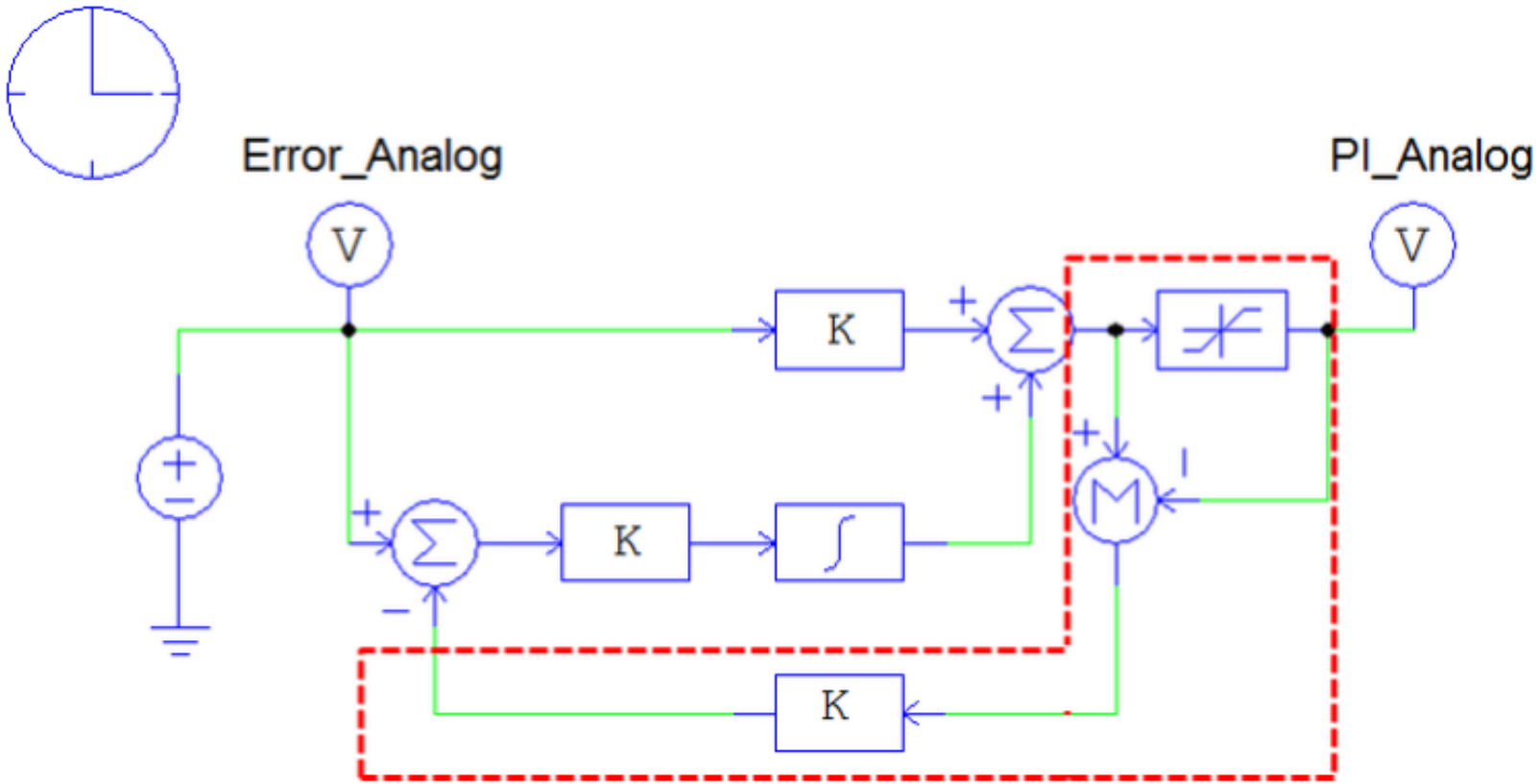




12) I 제어시 반드시 필요한 Anti-Windup 4



12) I 제어시 반드시 필요한 Anti-Windup 5



$$K_a = \frac{1}{K_p} \qquad \frac{1}{3}\frac{1}{K_p} < K_a < \frac{3}{K_p}$$