Ramp Error Constant

Determine $\mathbf{K_v}$ and the corresponding **tracking error** for ramp input for the following **system** and verify the result by generating the unit **ramp response** using MATLAB.

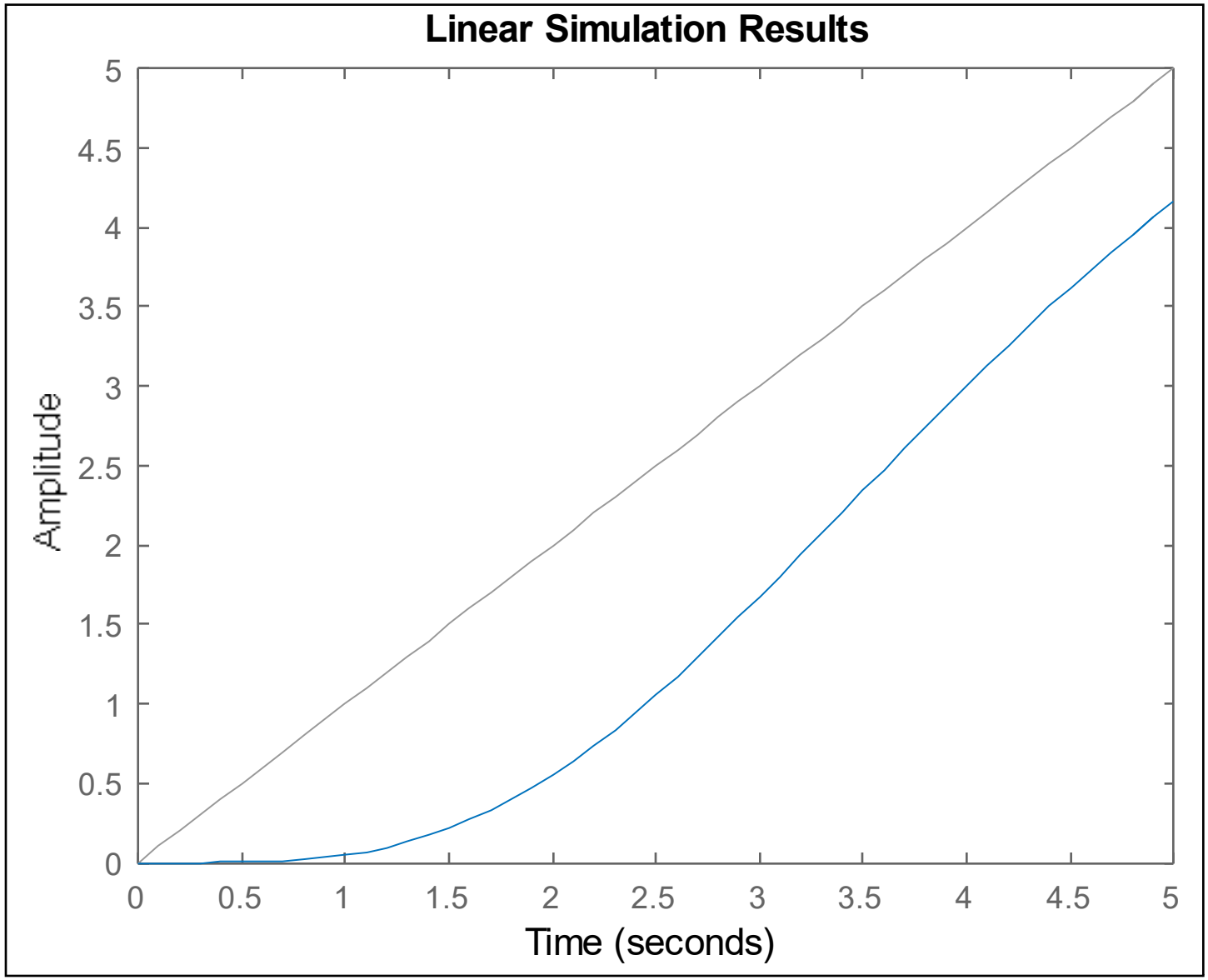
$$G(s) = \frac{20}{s(s+2)\left(s^2+6s+10\right)}$$

$$K_v = \frac{20}{20} = 1; \quad e_{ss} = \frac{1}{K_v} = 1.0$$

MATLAB Code:

```
g=zpk([],[0,-2,-3+i,-3-i],20)
T=0:0.1:5;
lsim(feedback(g,1),T,T)
```

Ramp Response Plot - MATLAB



Parabolic Error Constant

Determine $\mathbf{K_v}$ and the corresponding **tracking error** for parabolic input for the following **system** and verify it by generating the unit **ramp response** using MATLAB.

$$G(s) = \frac{10(s+6)(s+10)(s+8)(s+4)}{s^2(s+5)\left(s^2+4s+8\right)}$$

$$K_a = \frac{10\times 6\times 10\times 8\times 4}{5\times 8} = 480; \quad e_{ss} = \frac{1}{480} = 0.002$$

MATLAB Code:

```
g=zpk([-4,-6,-8,-10],[0,0,-5,-2+2*i,-2-2*i],10)
T=0:0.1:5;
for i=1:51
T2(i)=T(i)^2;
end
lsim(feedback(g,1),T2,T)
```

Parabolic Response Plot - MATLAB