文本

描述已自动生成

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图形用户界面, 文本, 应用程序, Word

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The static gain of is:

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The static gain means the steady state value of the output of a stable system for the unit step input.

The unit step responses of these 2 systems are:

图表, 折线图

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Q1 codes:

文本, 信件

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Graphical user interface, text, application

Description automatically generated

We know that for a DC motor, we have the following relations:

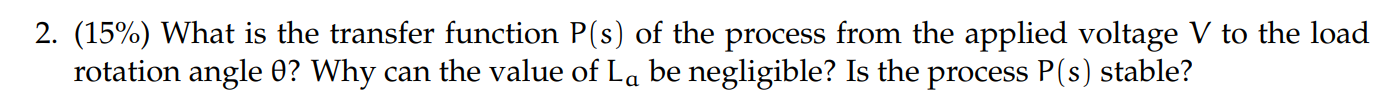
1. Rotor electric circuit
2. Torque equation
3. Back EMF question

It is given that

Rearranging the above questions we get :

Diagram

Description automatically generatedSo we can draw the following block diagram:

The transfer function can be represented :

Plugging in the coefficients and we get

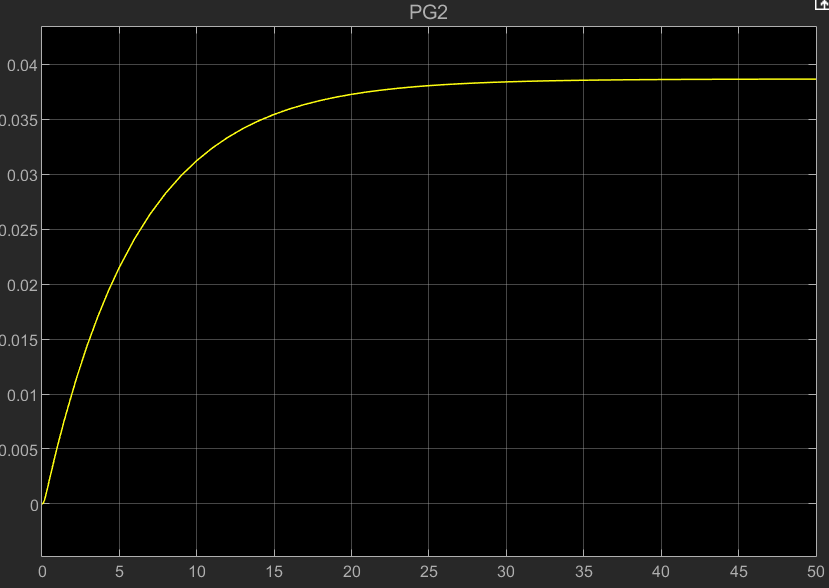
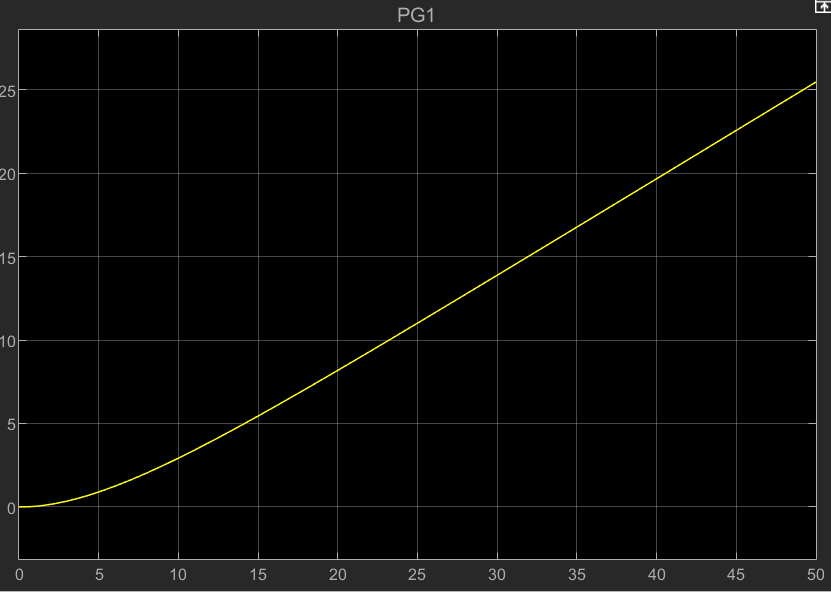
We see that the value of is relatively small so we can neglect it and the equation

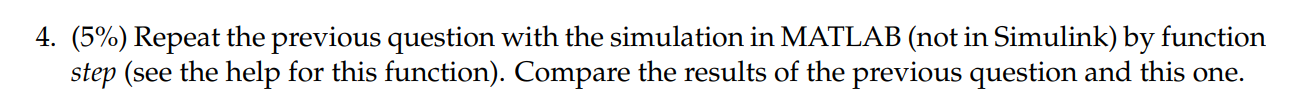
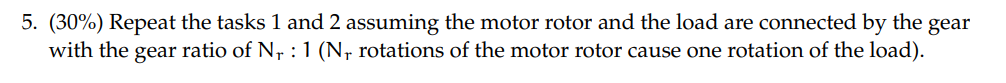
The poles of the transfer function are and one of the poles are at the origin so it is not stable.

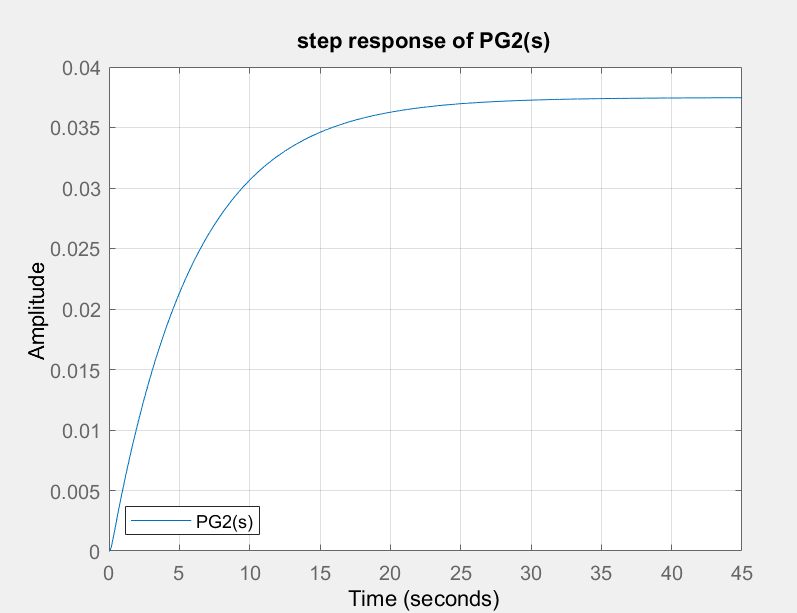
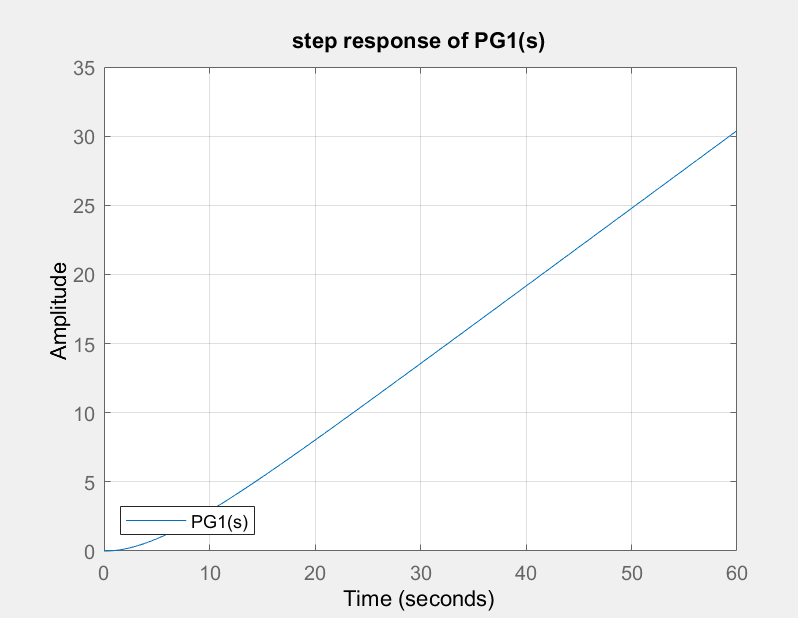
Text

Description automatically generated

Below are the 2 plots of and we can see that is not stable while is stable.



We see that compared to the results we obtained from part3, they are the same.



So the basic equations still hold and the following one changes into

It is given that

Diagram

Description automatically generatedRearranging the above questions we get :

And the transfer function between V and is:

Like before, the value of is relatively small and so the effect of it on the system is negligible. So it can be neglected.

Also, the plant is still unstable since it contains a pole which is not in the OLHP.