
MT240_NR_5_4_1 Summing Amplifier Function File

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Title

Description

This assignment goes in conjunction with MT240_NR_5_4_1 Summing Amplifier. Click on the link below to navigate to the parent document. [Sum Op-Amp](#)

The function takes in the parameters: Vs, Rf, Rs, Vpos, Vneg and returns Vout.

- Vs is a nxm matrix whose columns represent the different input voltage sources and whose rows represents the input voltage as a function of time. Below is an example of what Vs should look like.

$$\begin{aligned}V1 &= \frac{4}{\pi} \sin 2\pi t \\V2 &= \frac{4}{3\pi} \sin 6\pi t \\V3 &= \frac{4}{5\pi} \sin 10\pi t\end{aligned}$$

$$Vs = [V1^T \quad V2^T \quad V3^T]$$

$$Vs = \begin{bmatrix} V1(t=0) & V2(t=0) & \dots & Vn(t=0) \\ V1(t=\Delta t) & V2(t=\Delta t) & \dots & Vn(t=\Delta t) \\ V1(t=2\Delta t) & V2(t=2\Delta t) & \dots & Vn(t=2\Delta t) \\ \vdots & \vdots & \vdots & \vdots \\ V1(t=n\Delta t) & V2(t=n\Delta t) & \dots & Vn(t=n\Delta t) \end{bmatrix}$$

- Rf is the feedback in ohms. It is a single value.
- Rs is a mx1 matrix that represents the different source resistances for each source.
- Vpos is the positive voltage rail, V

- Vneg is the negative voltage rail, V
- Vout is a nx1 matrix that represents the output voltage of the operational amplifier as a function of time.

Exercise

1. Create a function file named Summing_OpAmp that takes in the values Vin, Rf, Rs, Vpos, and Vneg and returns Vout.
2. Calculate the gain of the op-amp. Since Rs is a 1xm matrix, the gain will be a 1xm matrix.
3. Calculate Vout ignoring clipping due to the rails.
4. Use logical expressions to clip Vout at the rails instead of using a nested for-loop.

Do not use any types of loops or use the sum command in this assignment. If you use the set-up described above, the problem is a simple matrix multiplication.

Questions

See parent document

Useful Information

There is no useful information provided to you. If needed, look back at assignment

[mt240_nr_5_3_1_inverting_op_amp_function](#)

Provided Code

```
function [Vout] = Summing_OpAmp(Vs , Rs, Rf, Vpos, Vneg)

G = % INSERT CODE HERE           % Calculate Gain
Vout = % INSERT CODE HERE         % Calculate Vout, V
Vout(Vout < Vneg) = % INSERT CODE HERE % Clip Vout at the negative
    rail.
Vout(Vout > Vpos) = % INSERT CODE HERE % Clip Vout at the positive
    rail.
```

Solution

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