

Chapter 6 - The Operational Amplifier

Lecture 19

Section 6.4

MEMS 0031 Electrical Circuits

Mechanical Engineering and Materials Science Department
University of Pittsburgh



Student Learning Objectives

Chapter 6 - The
Operational
Amplifier

MEMS 0031

At the end of the lecture, students should be able to:

- ▶ Analyze a variety of operational amplifiers (inverting, non-inverting, differencing, bridge) using node voltage analysis

Learning Objectives

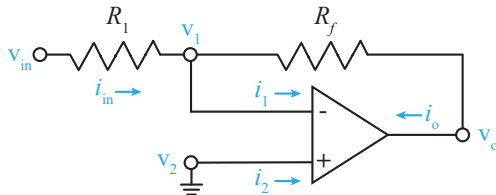
6.4 Nodal Analysis
of the Operational
Amplifier

Summary



Inverting Amplifier

- ▶ We can re-express the output of the inverting op-amp in terms of gain, k :



Learning Objectives

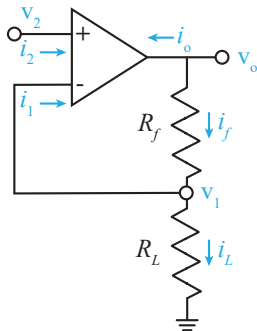
6.4 Nodal Analysis of the Operational Amplifier

Summary



Non-inverting Amplifier

- ▶ We can re-express the output of the non-inverting op-amp in terms of gain, k :



Learning Objectives

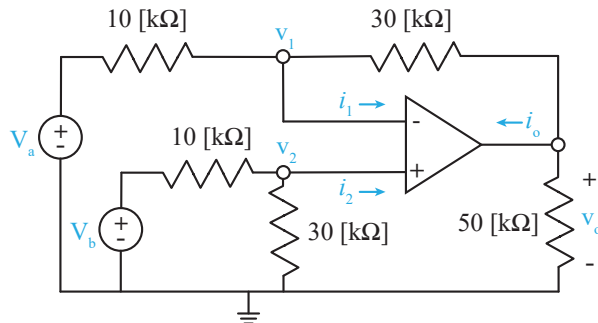
6.4 Nodal Analysis of the Operational Amplifier

Summary



Example #1

- Determine the output voltage of the differencing amplifier shown below:



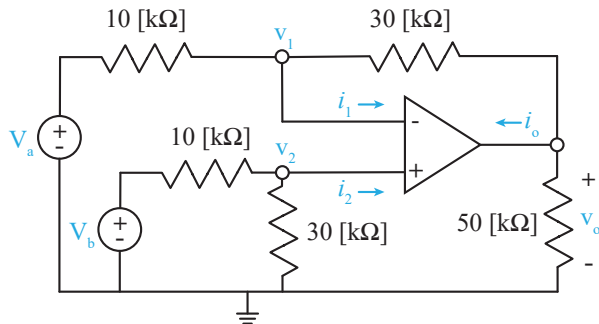
Learning Objectives

6.4 Nodal Analysis of the Operational Amplifier

Summary



Example #1



Learning Objectives

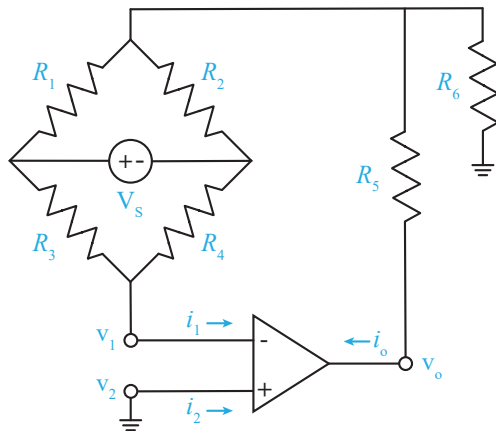
6.4 Nodal Analysis of the Operational Amplifier

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Example #2

- Determine the output voltage of the bridge amplifier shown below:



Learning Objectives

6.4 Nodal Analysis of the Operational Amplifier

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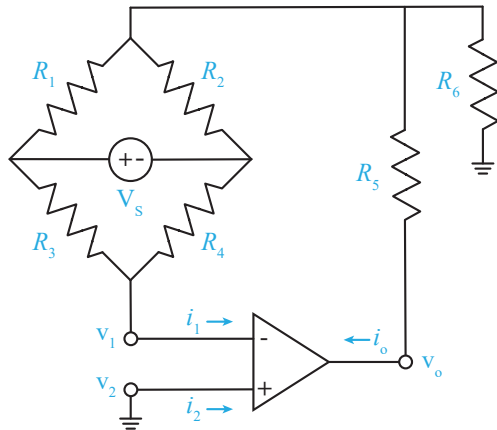


Example #2

Learning Objectives

6.4 Nodal Analysis of the Operational Amplifier

Summary

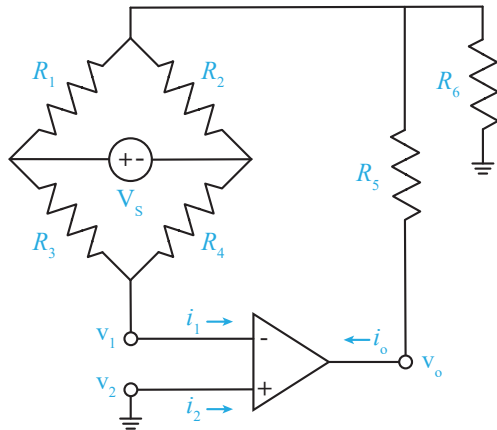


Example #2

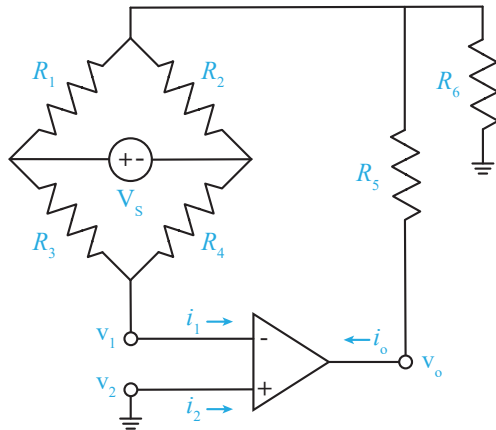
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Example #2



Student Learning Objectives

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At the end of the lecture, students should be able to:

- ▶ Analyze a variety of operational amplifiers (inverting, non-inverting, differencing, bridge) using node voltage analysis
- ▶ The analysis of any type of operational amplifier was pursued by applying KCL at the node that relates the input and output signals.

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Suggested Problems

- ▶ 6.4-1, 6.4-3, 6.4-5, 6.4-8, 6.4-9, 6.4-12, 6.4-14, 6.4-15, 6.4-17, 6.4-21, 6.4-26

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