

Structured Electronic Design

Negative Feedback amplifiers with OpAmp controllers

Wrap-up

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1. Amplifier types

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 - a. Nine unilateral types

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 - b. Six non unilateral types

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 - a. Nine unilateral types
 - b. Six non unilateral types
 - c. Five port isolation configurations for each type

Wrap-up

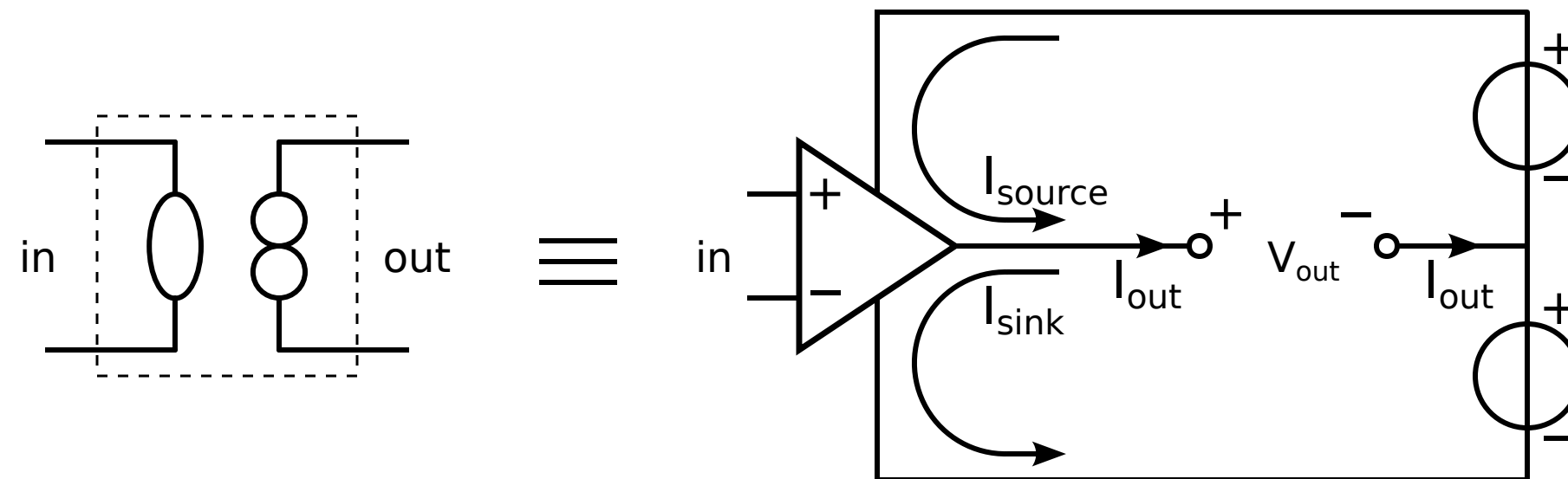
1. Amplifier types
 - a. Nine unilateral types
 - b. Six non unilateral types
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2. All types can be realized with controllers that behave as natural two ports and transformers and gyrators as feedback elements

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3. The operational amplifier does not behave as a natural two port:

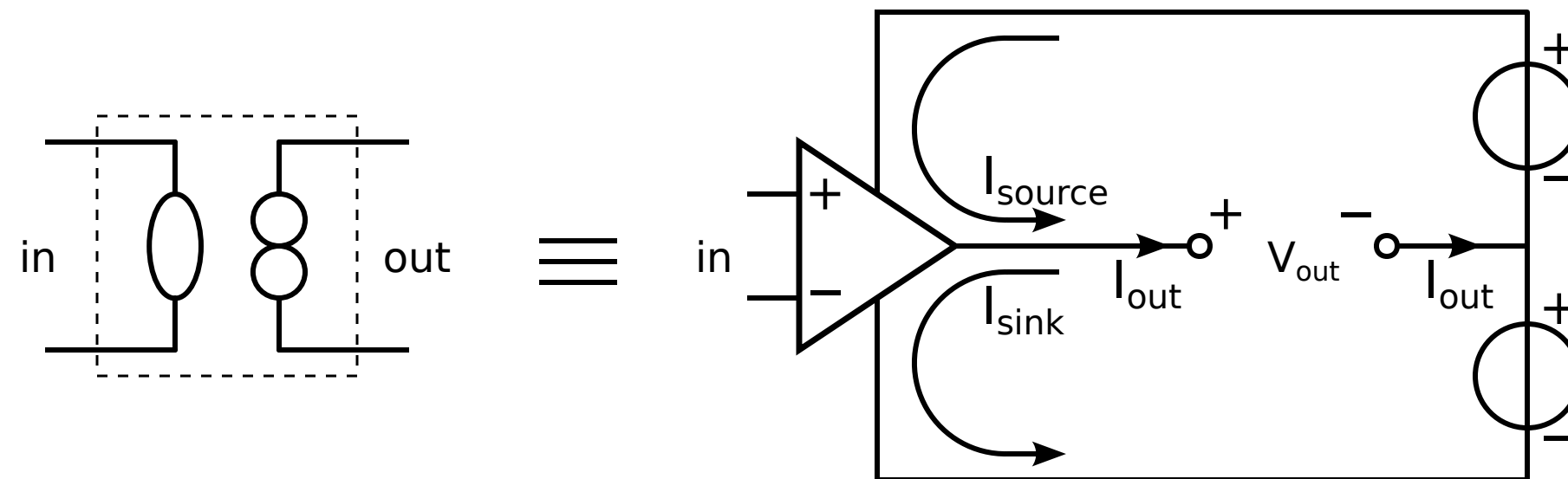
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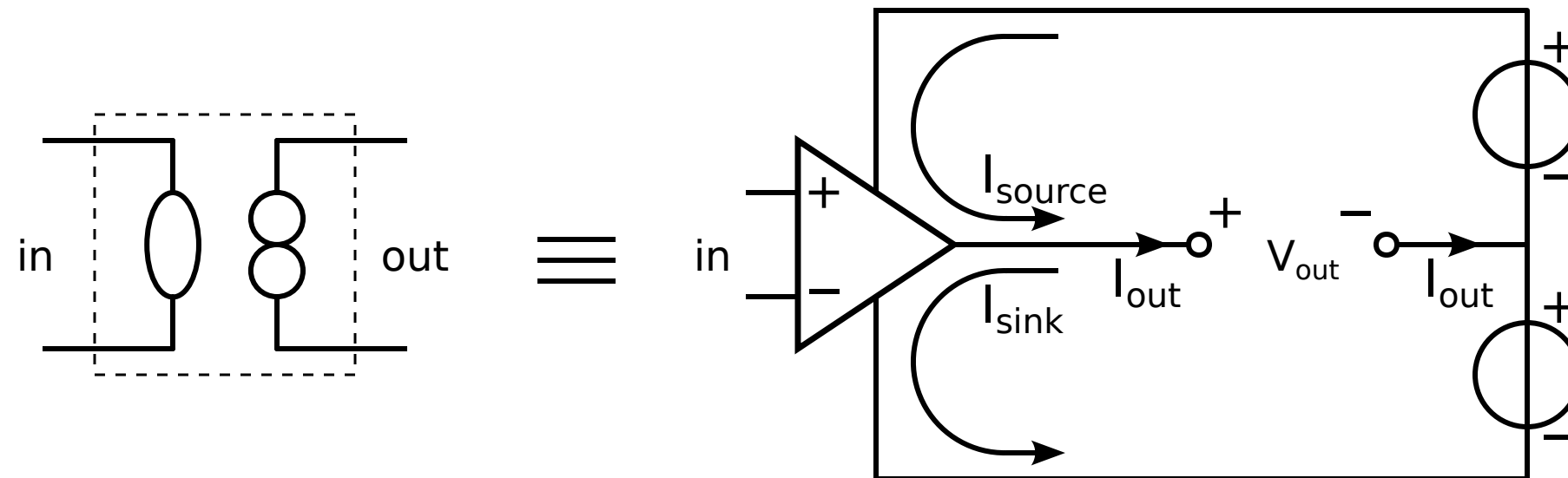
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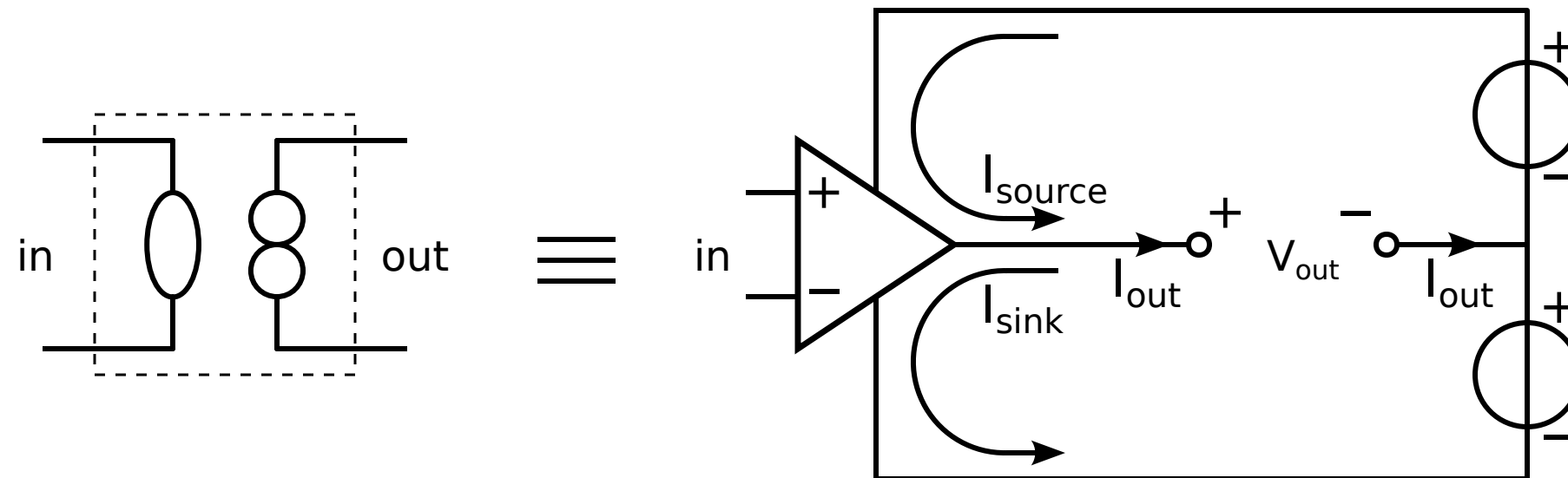
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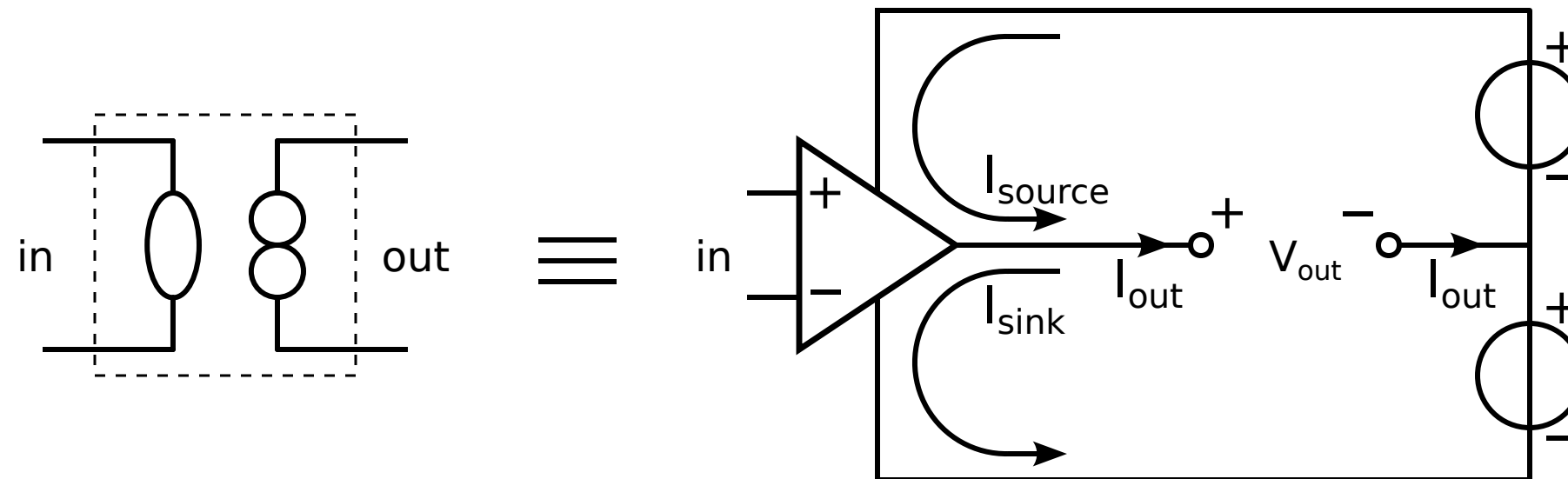
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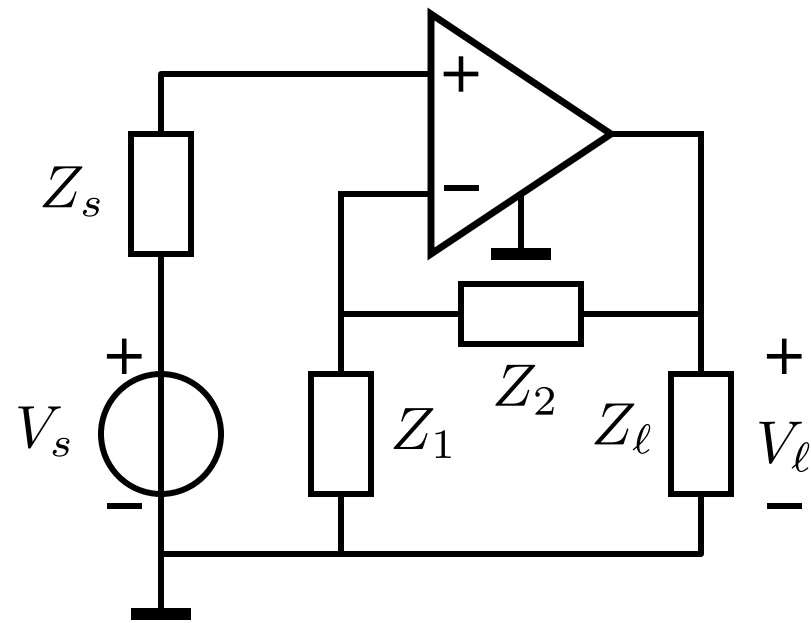
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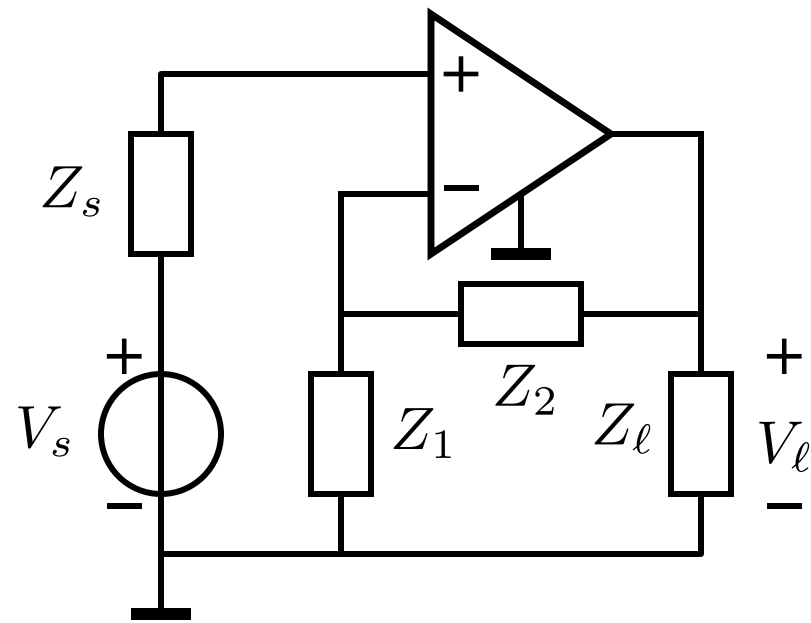
Single-loop passive feedback configurations

Single-loop passive feedback configurations



Non-inverting
voltage amplifier

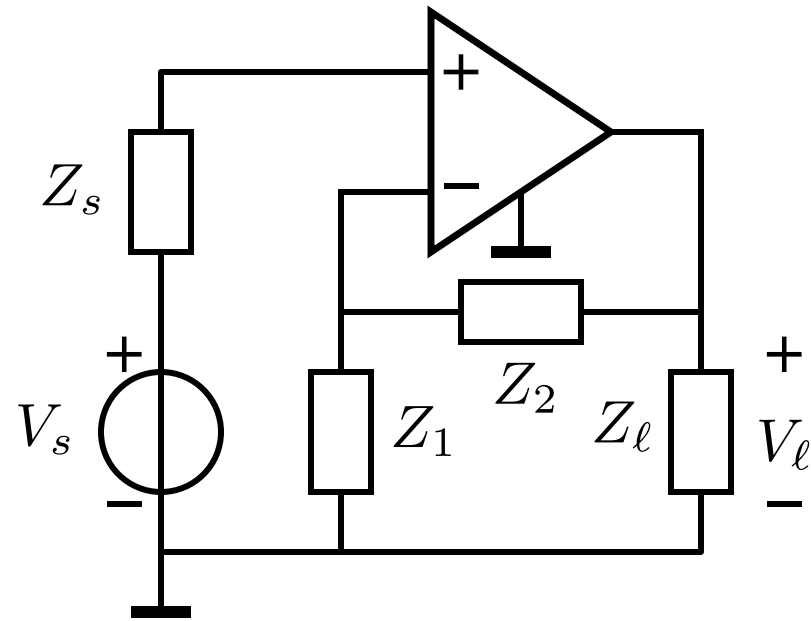
Single-loop passive feedback configurations



Non-inverting
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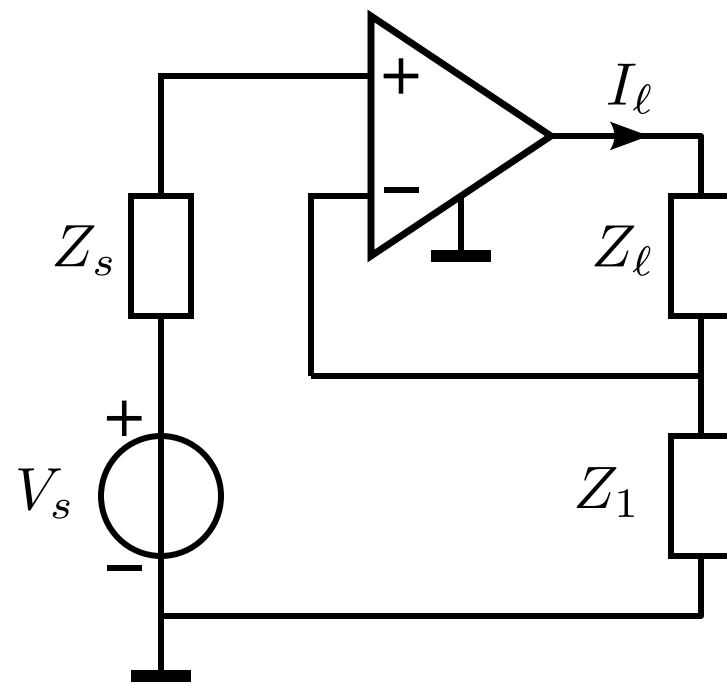
- Grounded source
- Grounded load

Single-loop passive feedback configurations



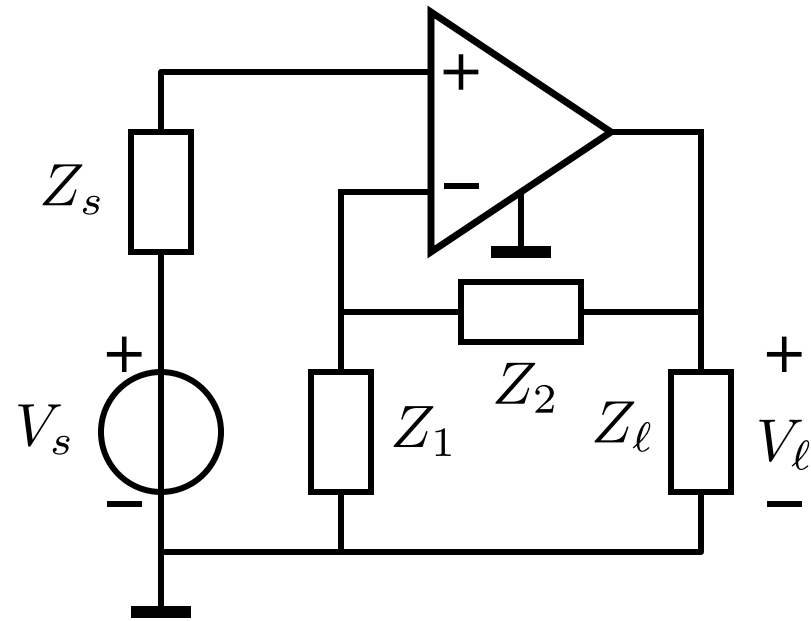
Non-inverting
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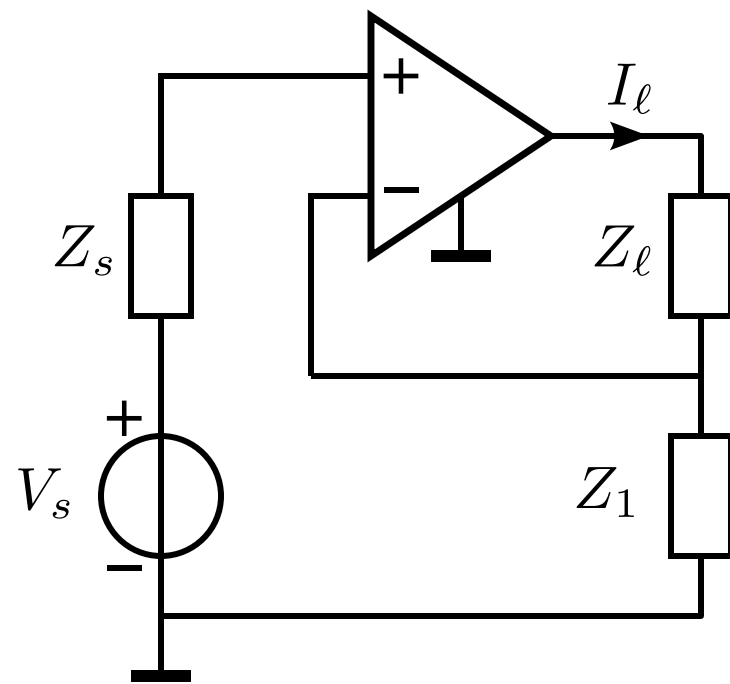
Transadmittance

Single-loop passive feedback configurations



Non-inverting voltage amplifier

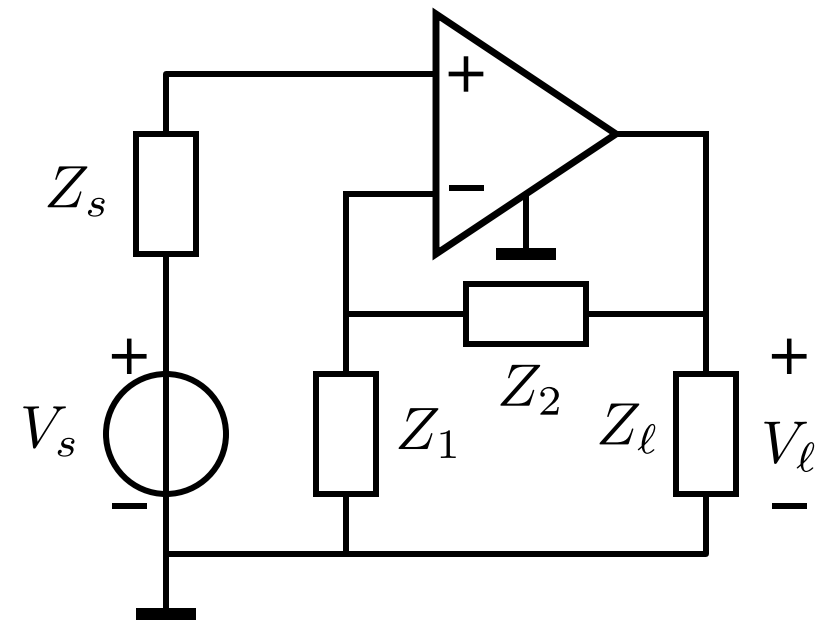
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Transadmittance

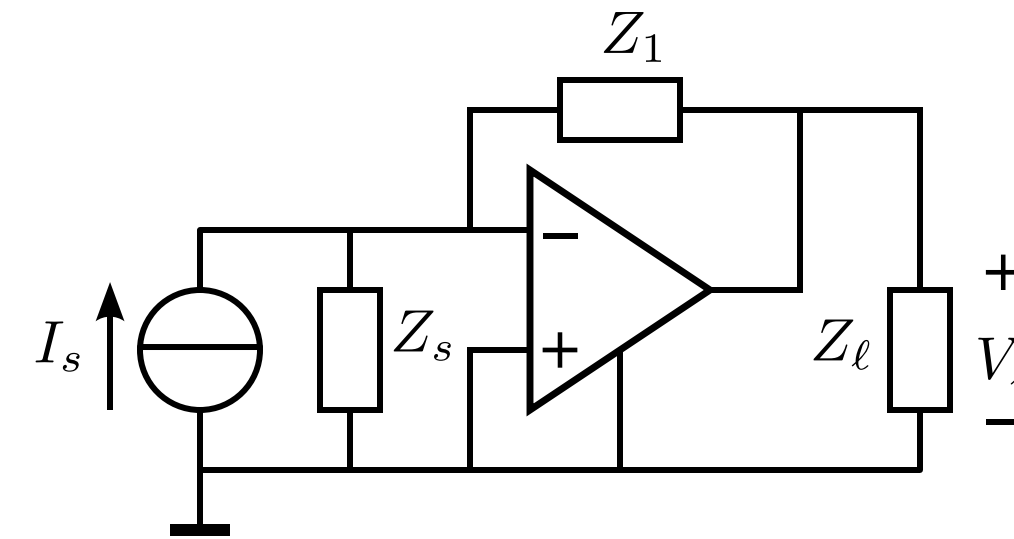
- Grounded source
- Floating load

Single-loop passive feedback configurations

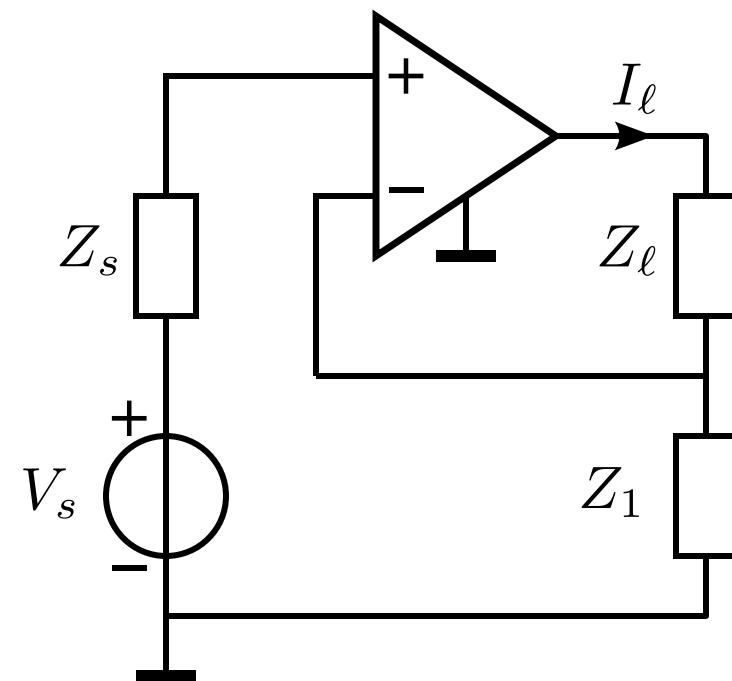


Non-inverting
voltage amplifier

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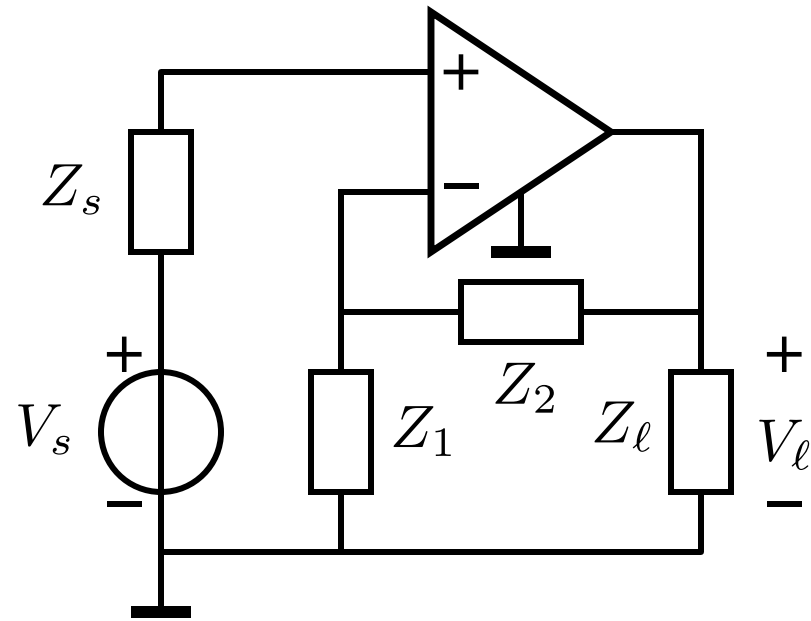
Inverting
transimpedance



Transadmittance

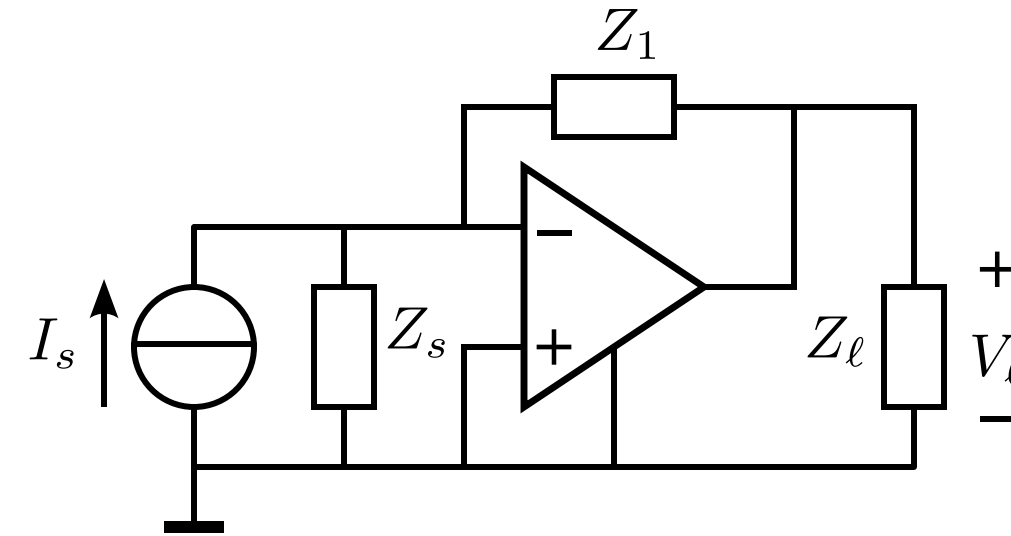
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Single-loop passive feedback configurations



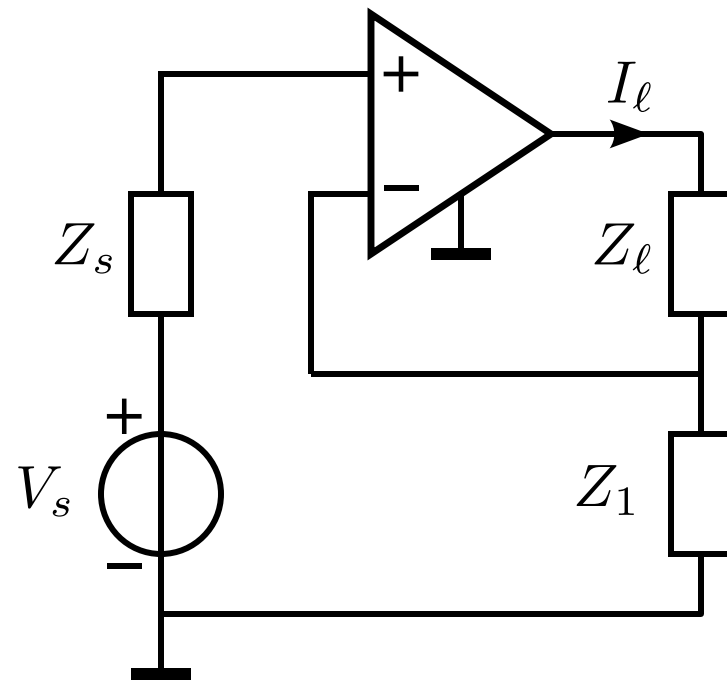
Non-inverting voltage amplifier

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Inverting transimpedance

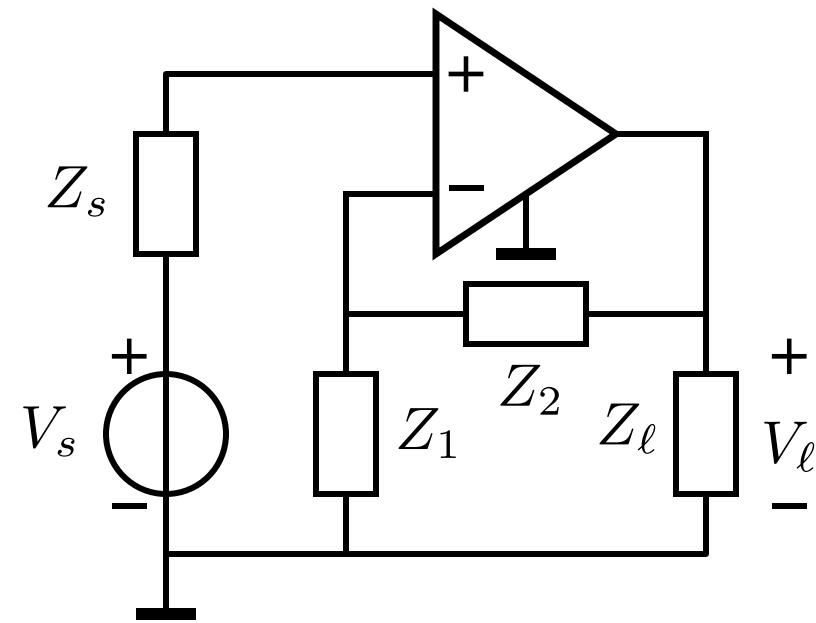
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Transadmittance

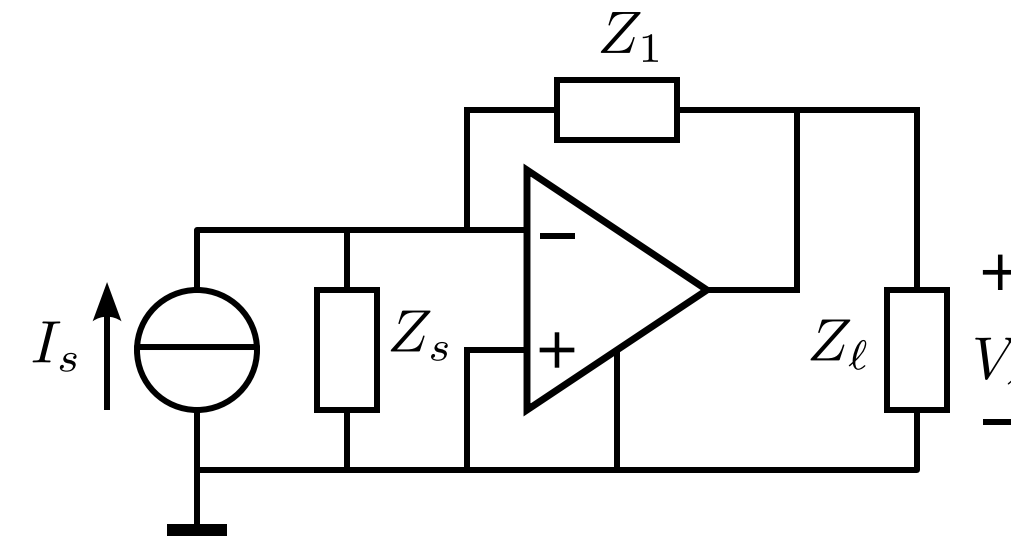
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Single-loop passive feedback configurations



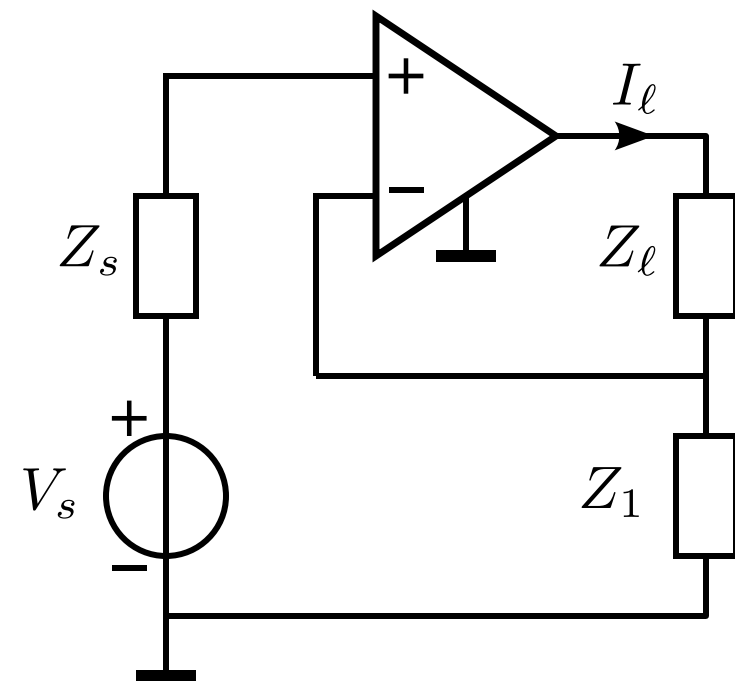
Non-inverting
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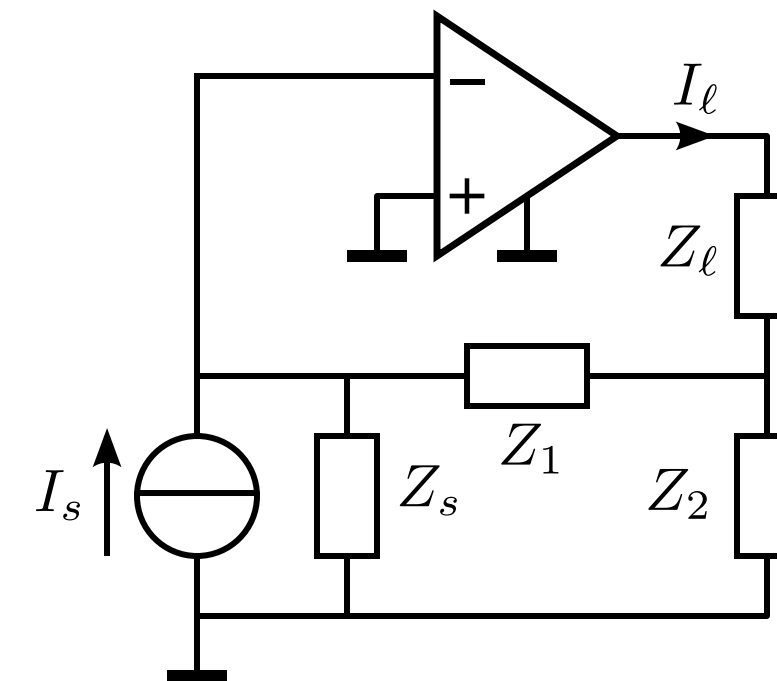
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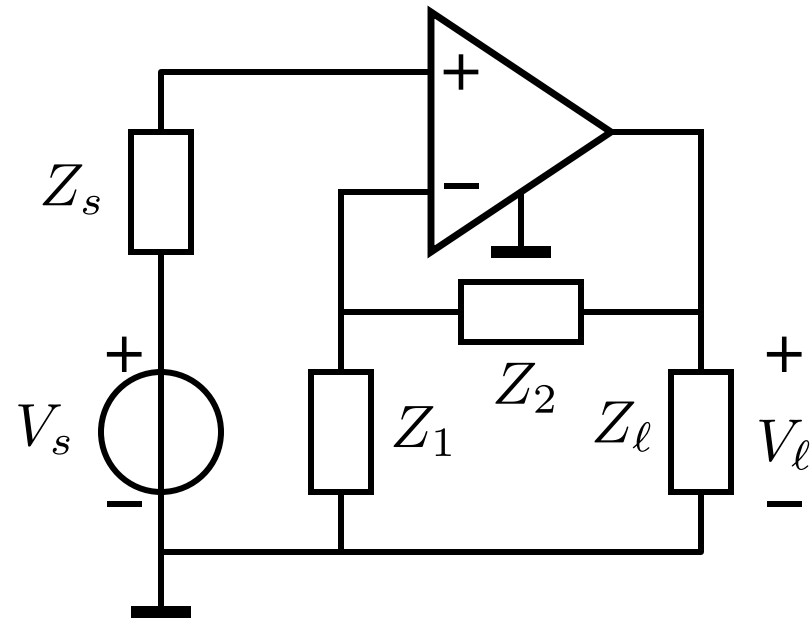
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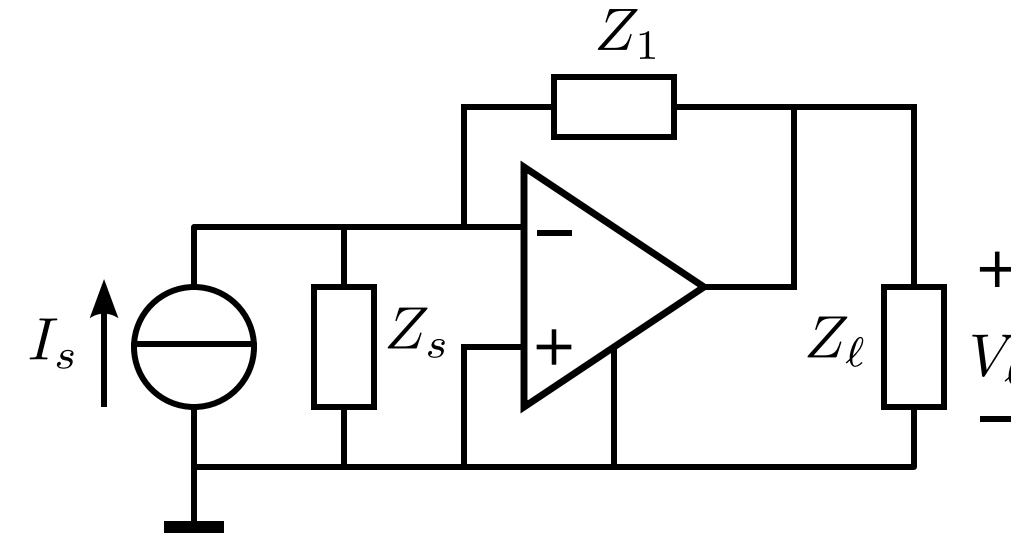
Current amplifier

Single-loop passive feedback configurations



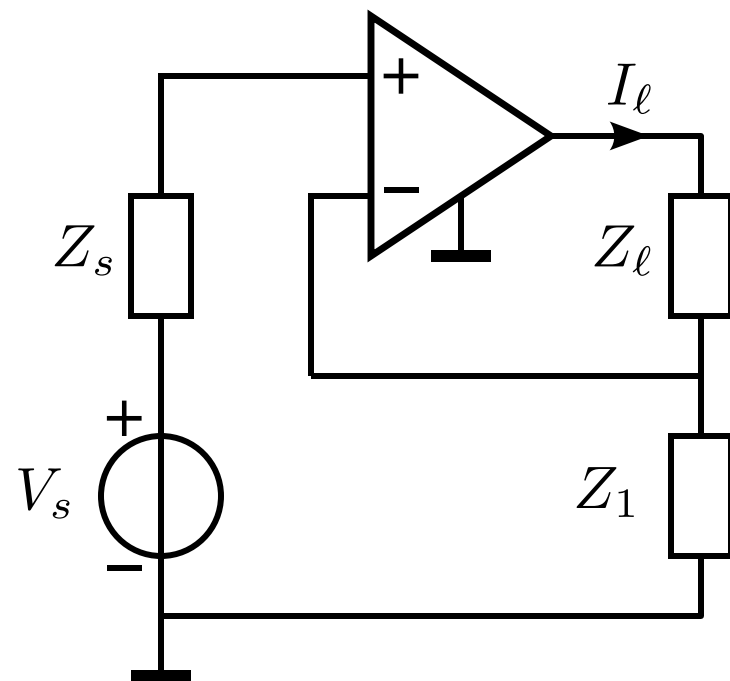
Non-inverting voltage amplifier

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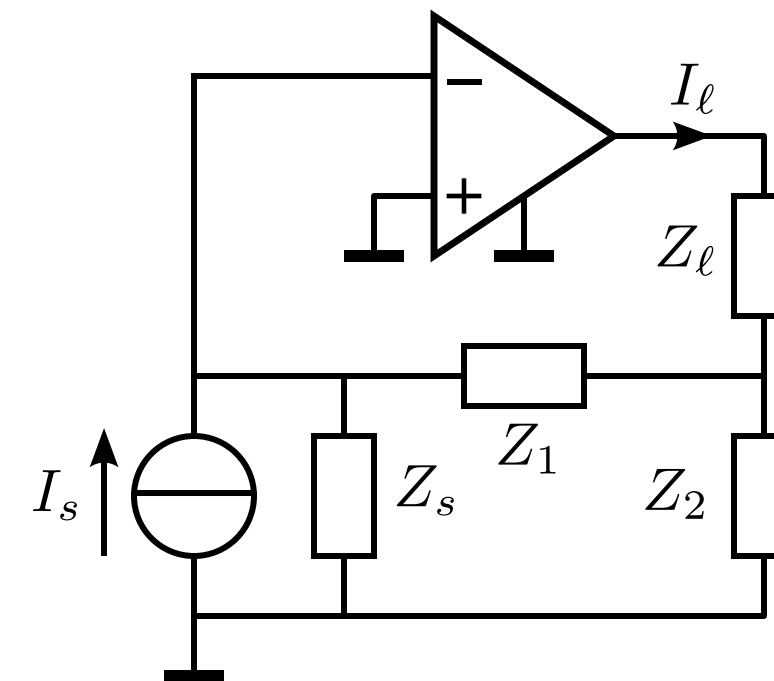
Inverting transimpedance

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Transadmittance

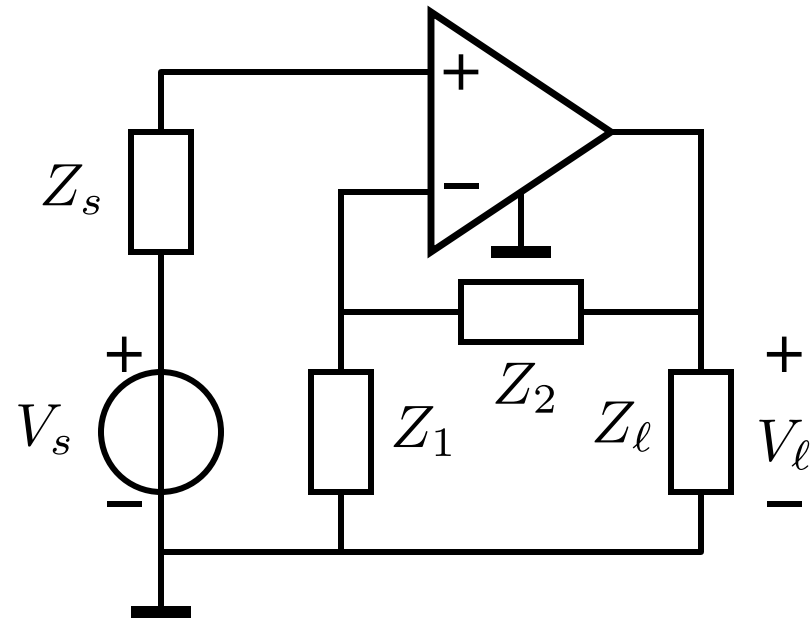
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Current amplifier

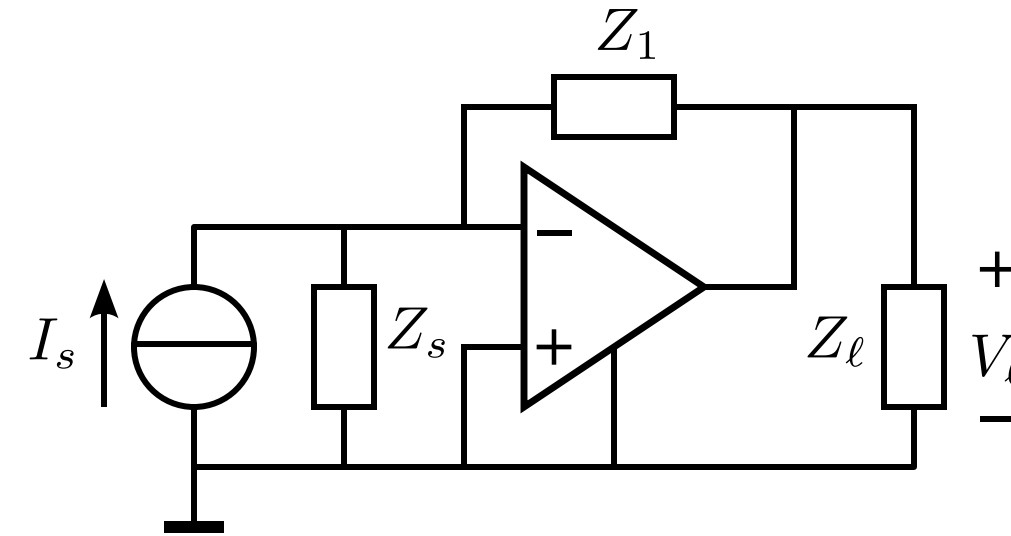
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Single-loop passive feedback configurations



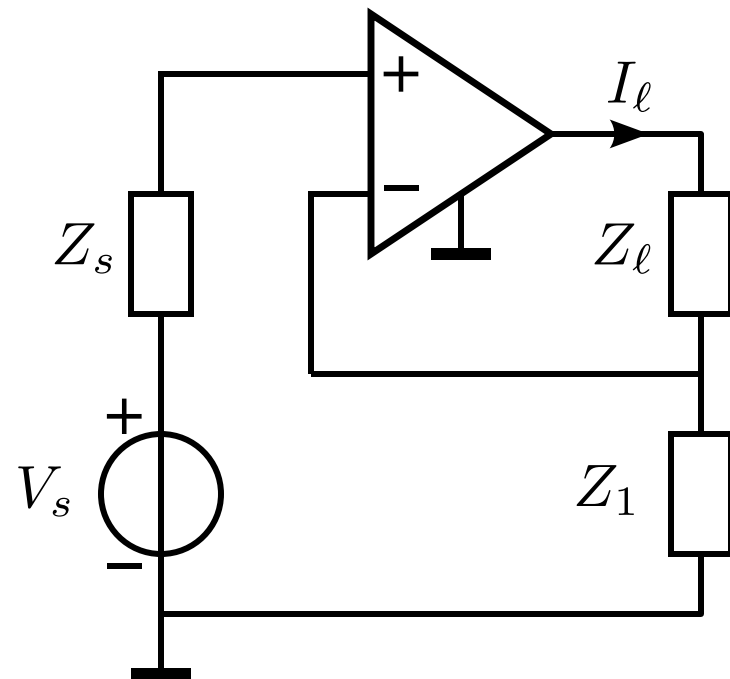
Non-inverting
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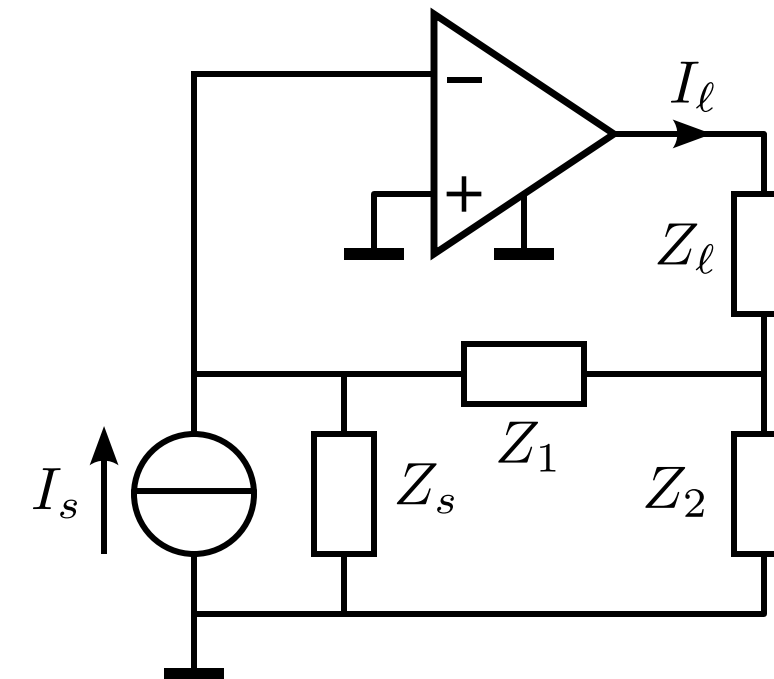
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Transadmittance

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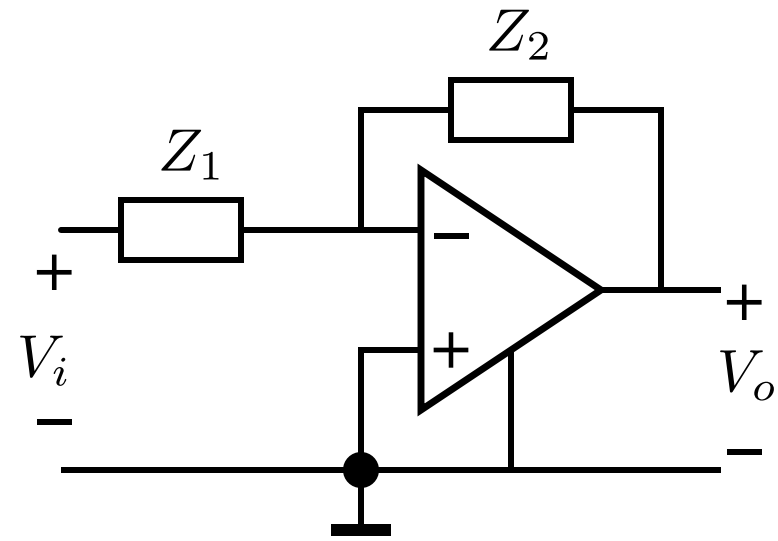


Current amplifier

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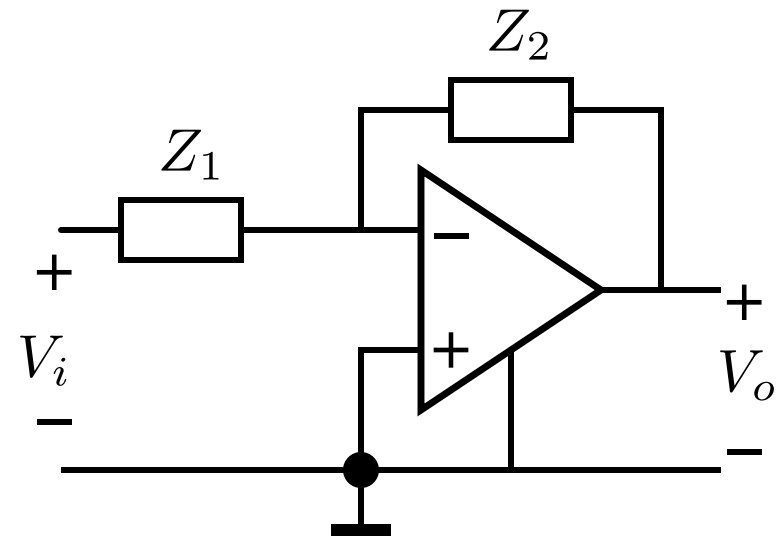
Active feedback

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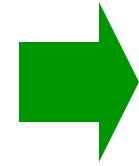


Active inverting
voltage attenuator

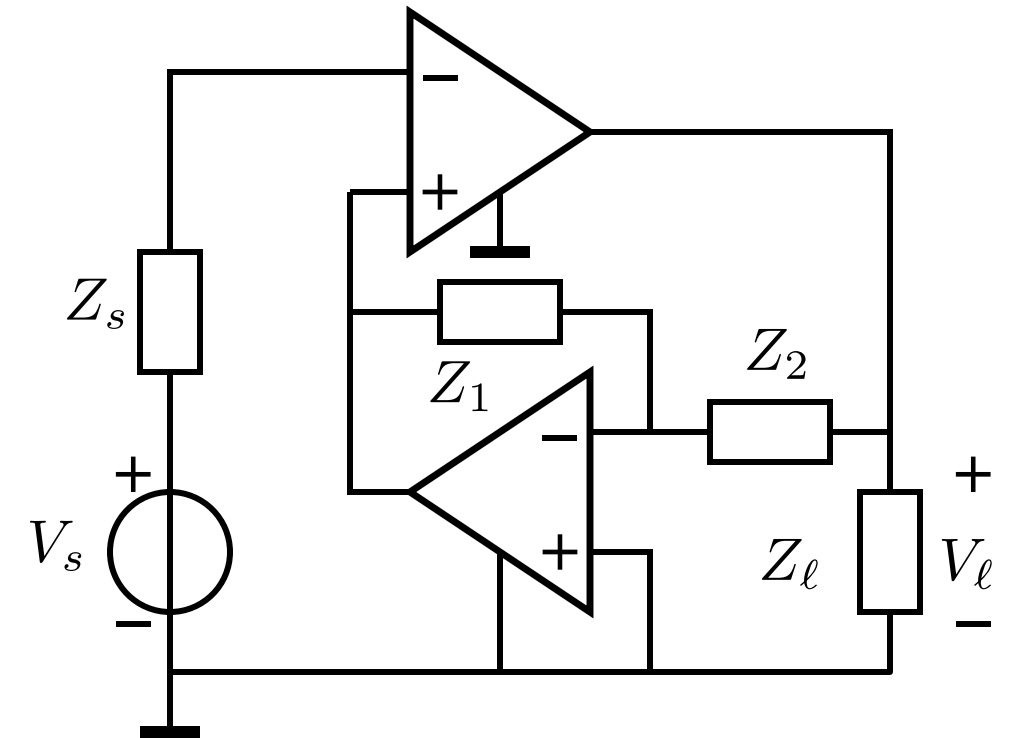
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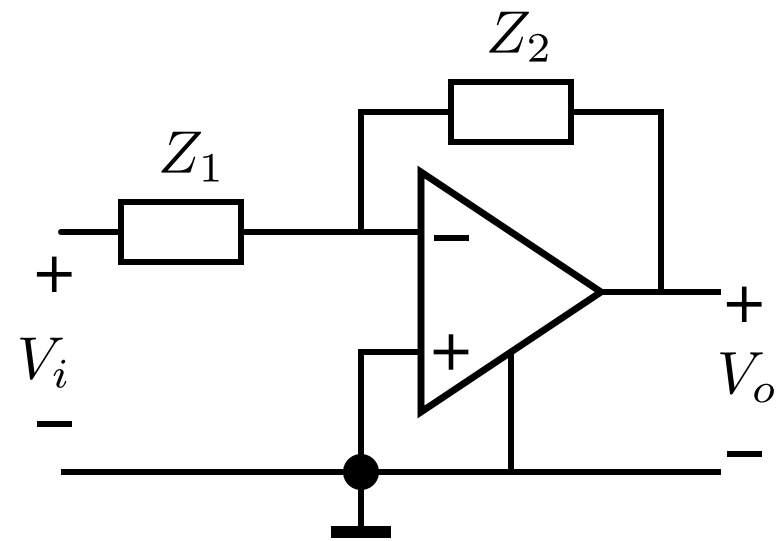
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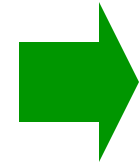
Inverting
voltage amplifier



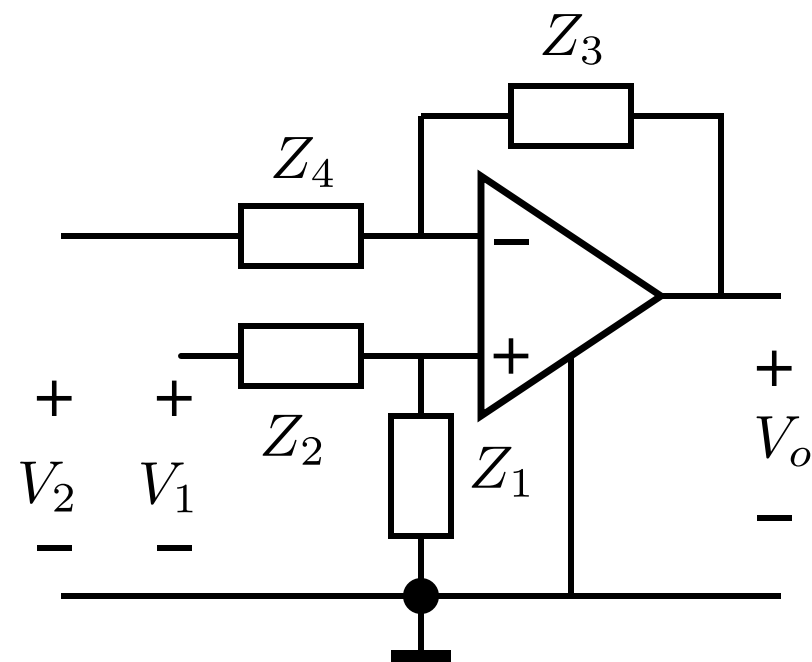
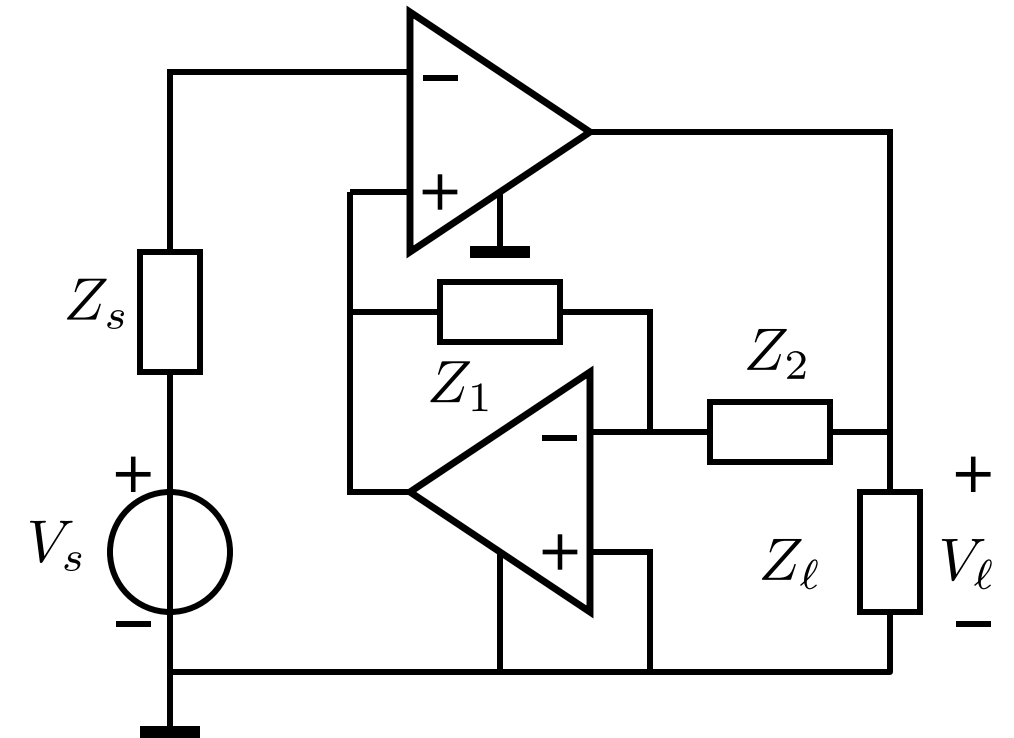
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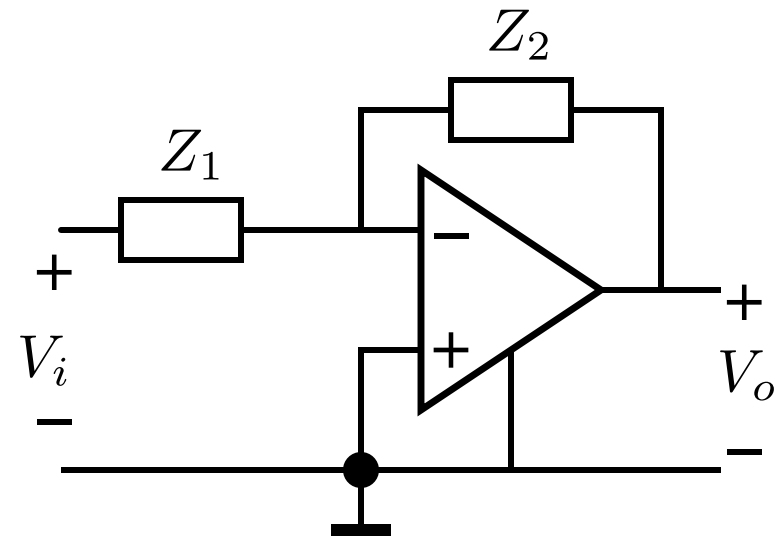


Floating voltage to
grounded voltage

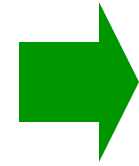
$$\frac{Z_1}{Z_2} = \frac{Z_3}{Z_4}$$

$$V_o = \frac{Z_1}{Z_2} (V_1 - V_2)$$

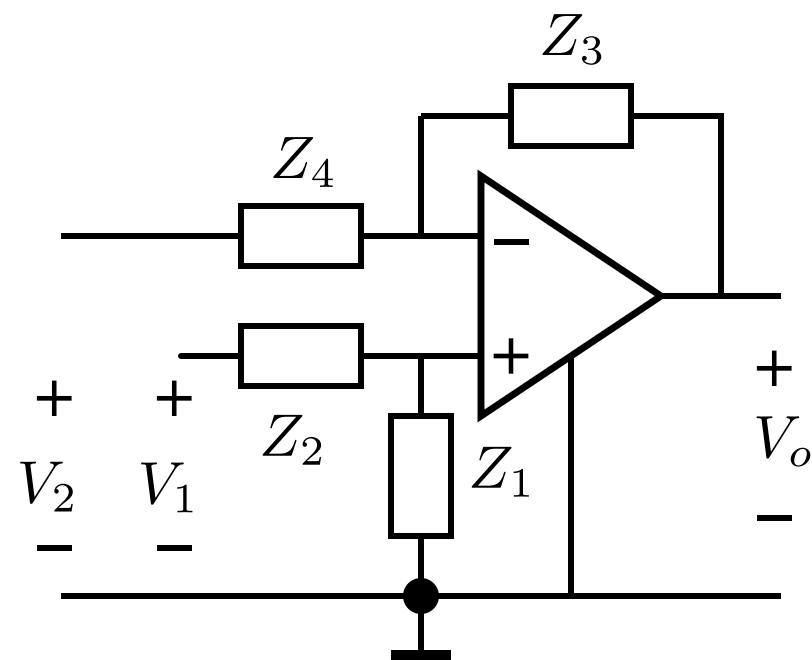
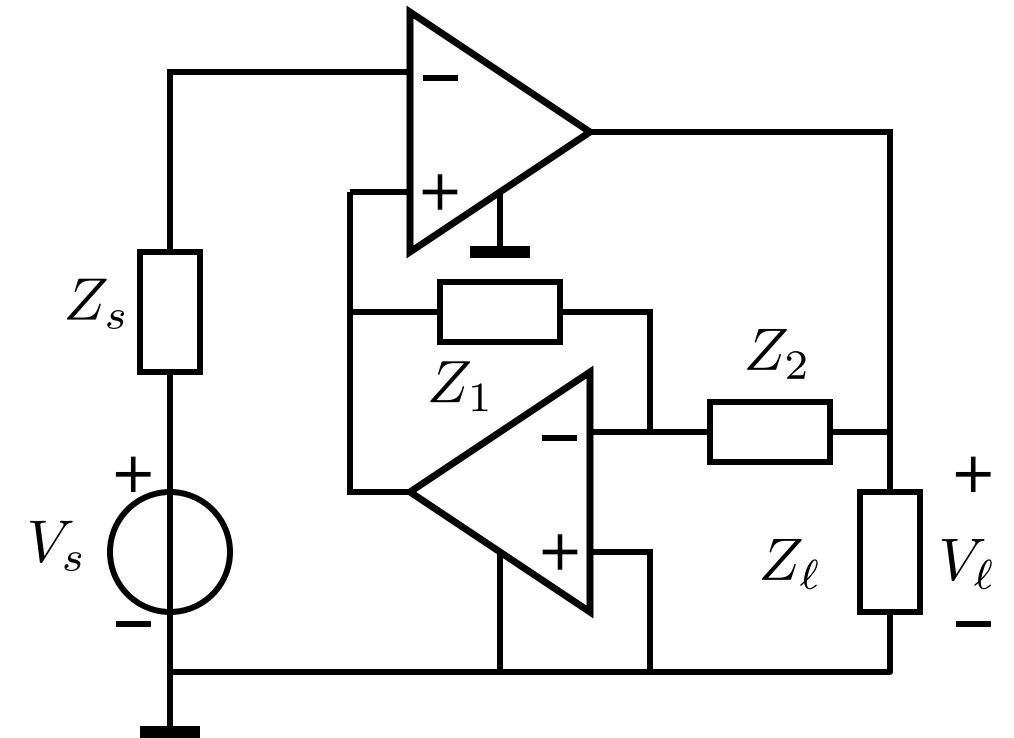
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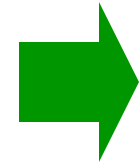
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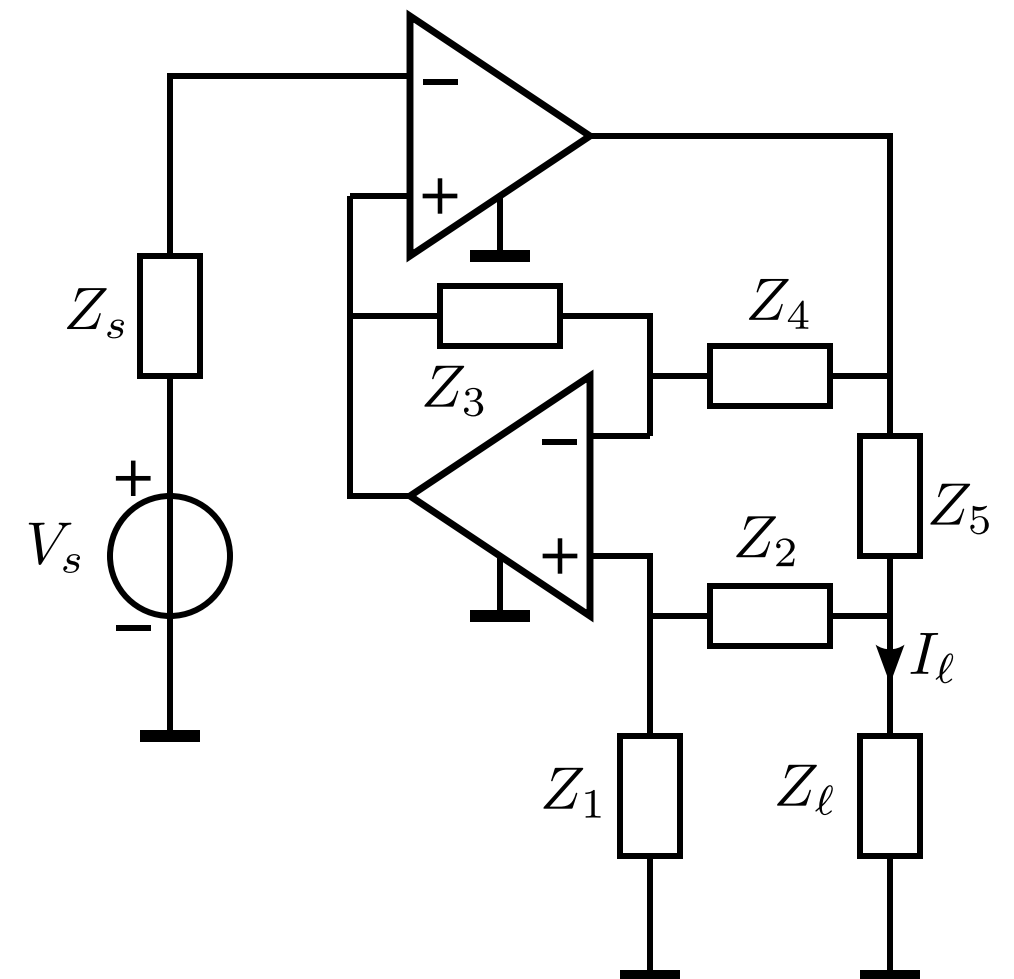
Inverting
voltage amplifier



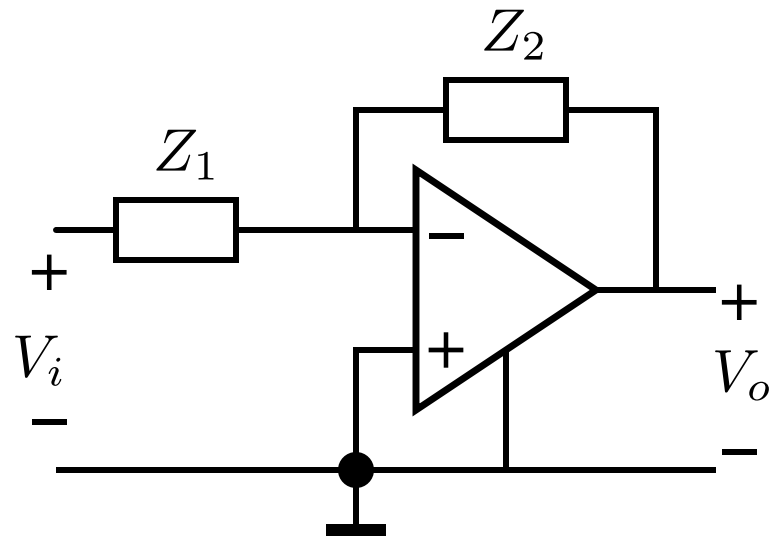
Floating voltage to
grounded voltage



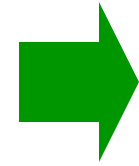
Transadmittance
with grounded
load



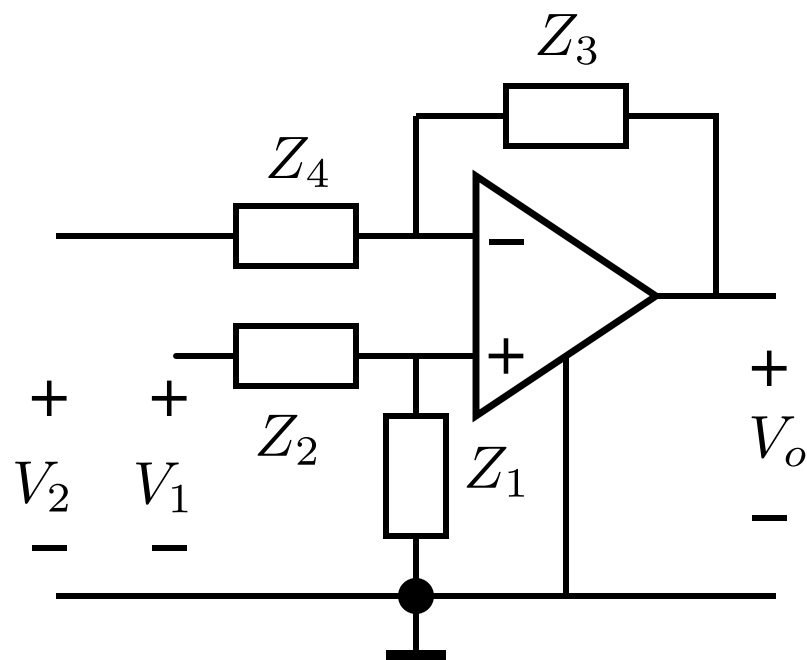
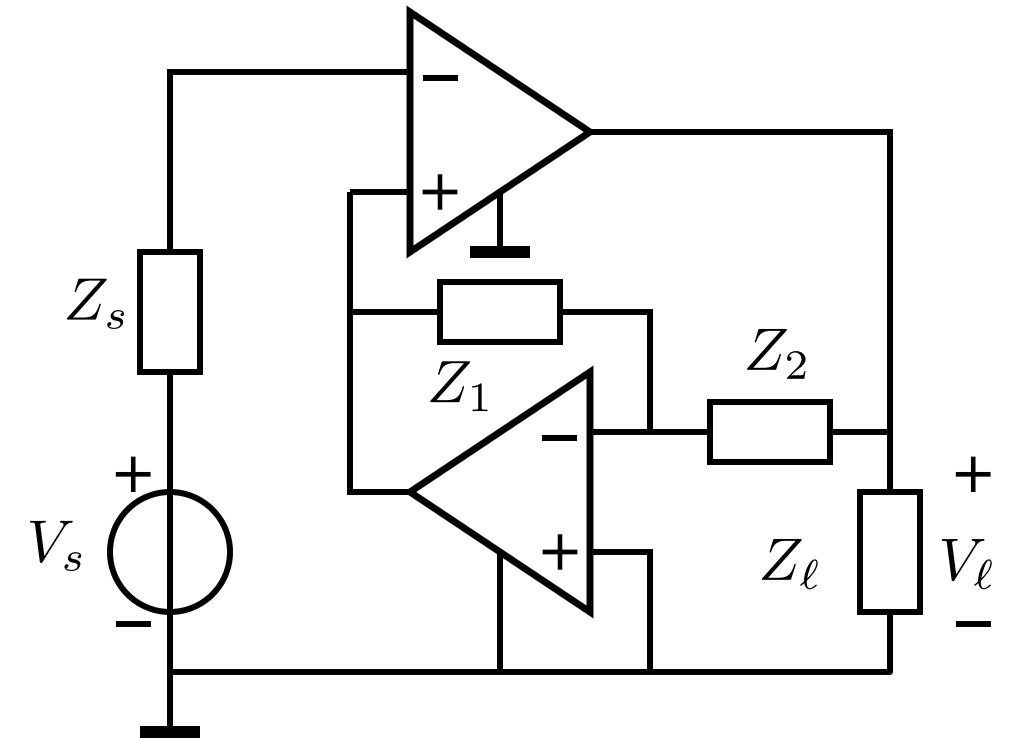
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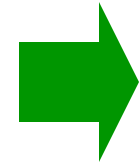
Active inverting
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Inverting
voltage amplifier



Floating voltage to
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Transadmittance
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