

Operational Amplifiers (Op Amps)

LECTURE 11

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Introduction

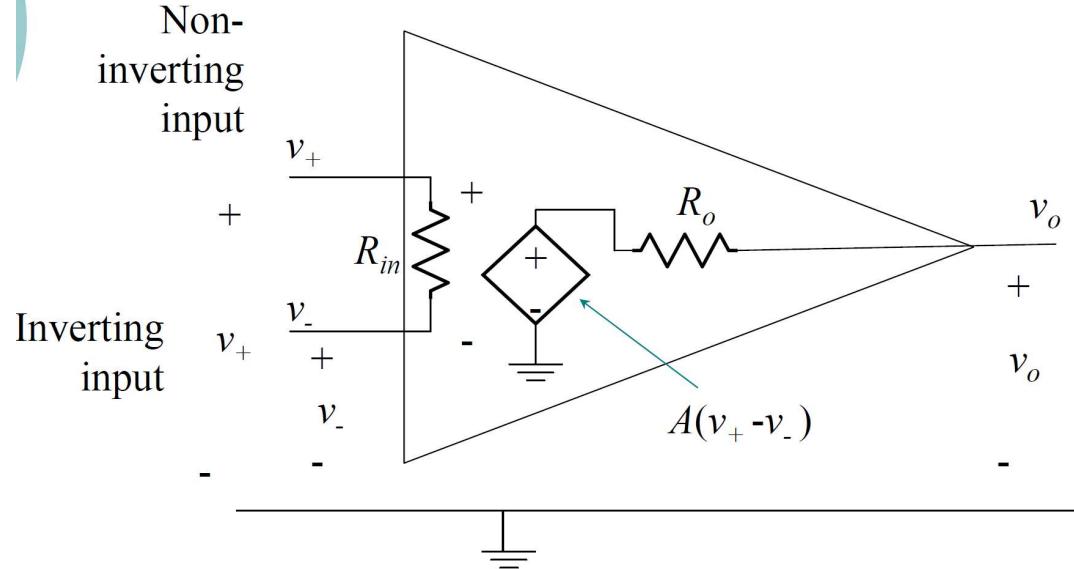
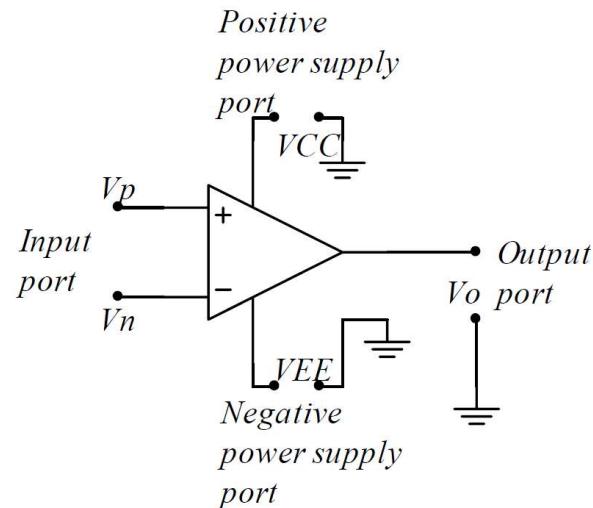
- ❑ An operational amplifier is modelled as a voltage controlled voltage source.
- ❑ An operational amplifier has a very high input impedance and a very high gain.
- ❑ Op amps can be configured in many different ways using resistors and other components.
- ❑ Most configurations use feedback.

Applications of Op Amps

- Amplifiers provide gains in voltage or current.
- Op amps can convert current to voltage.
- Op amps can provide a buffer between two circuits.
- Op amps can be used to implement integrators and differentiators.

The Op Amp Model

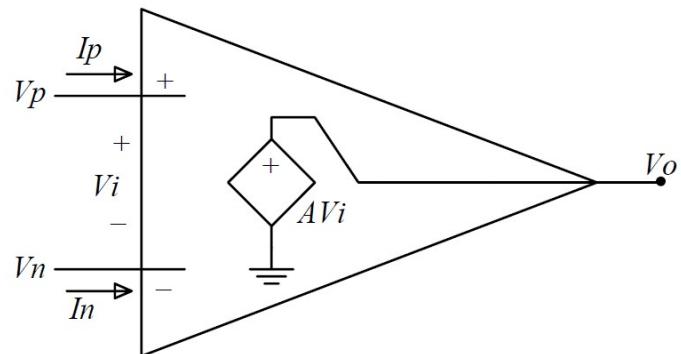
It is a five terminal four port active element.



The symbol of the op-amp

Equivalent circuit model of op-amp device

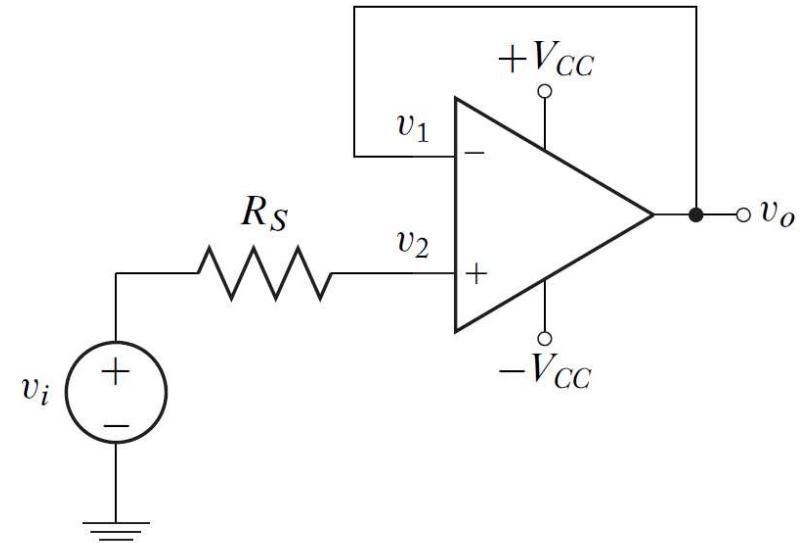
The ideal op-amp model



Ideal op-amp model.

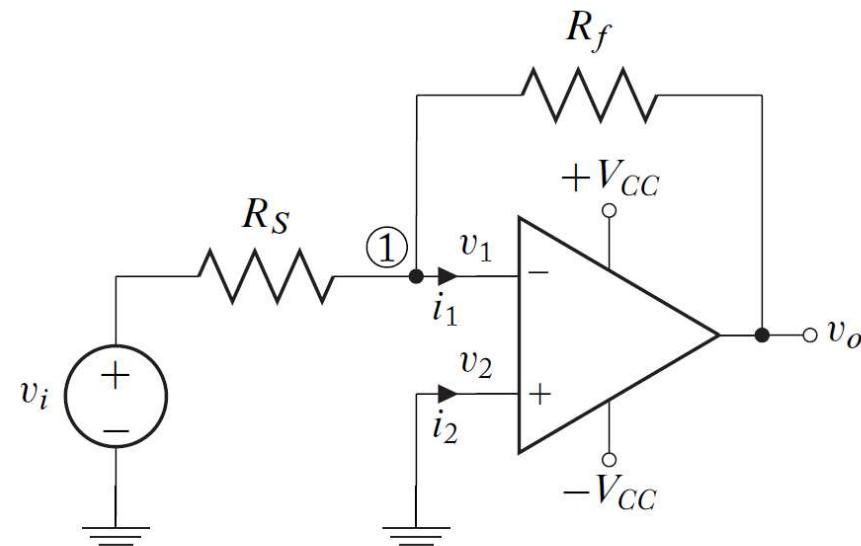
- No current flows into the input terminals of the device. This is equivalent to having an infinite input resistance $R_i=\infty$.
- In practical terms this implies that the amplifier device will make no power demands on the input signal source.
- Have a zero output resistance ($R_o=0$). This implies that the output voltage is independent of the load connected to the output.

Unity Gain Buffer/ Voltage Follower



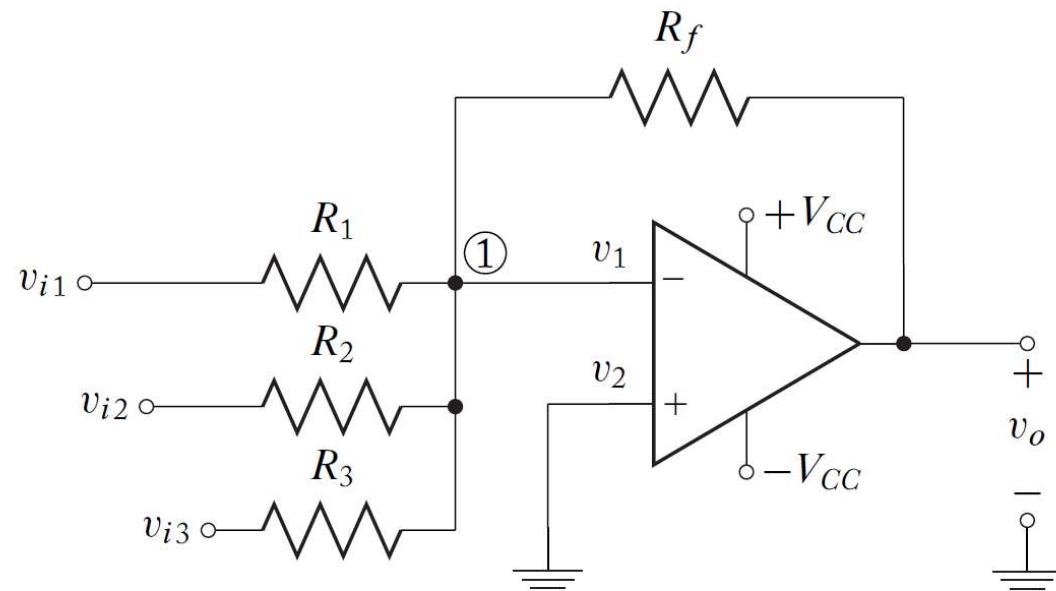
Example : Unity Gain Buffer/ Voltage Follower

Inverting Amplifier



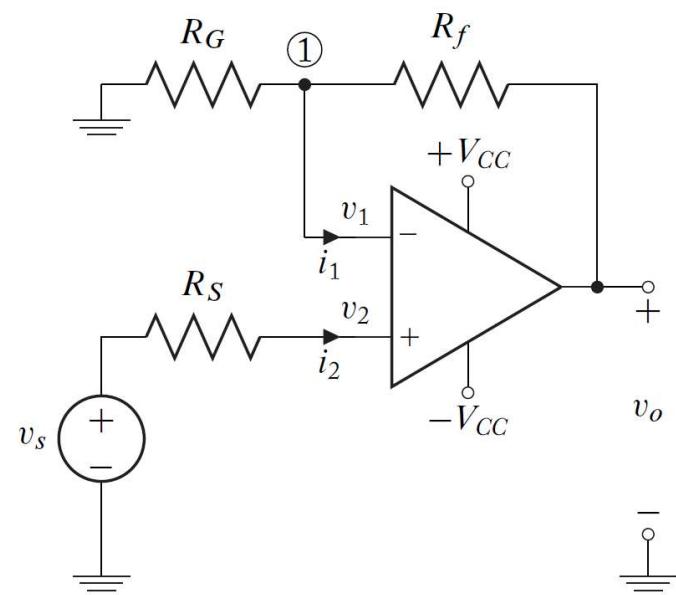
Example : Inverting Amplifier

Summing Amplifier

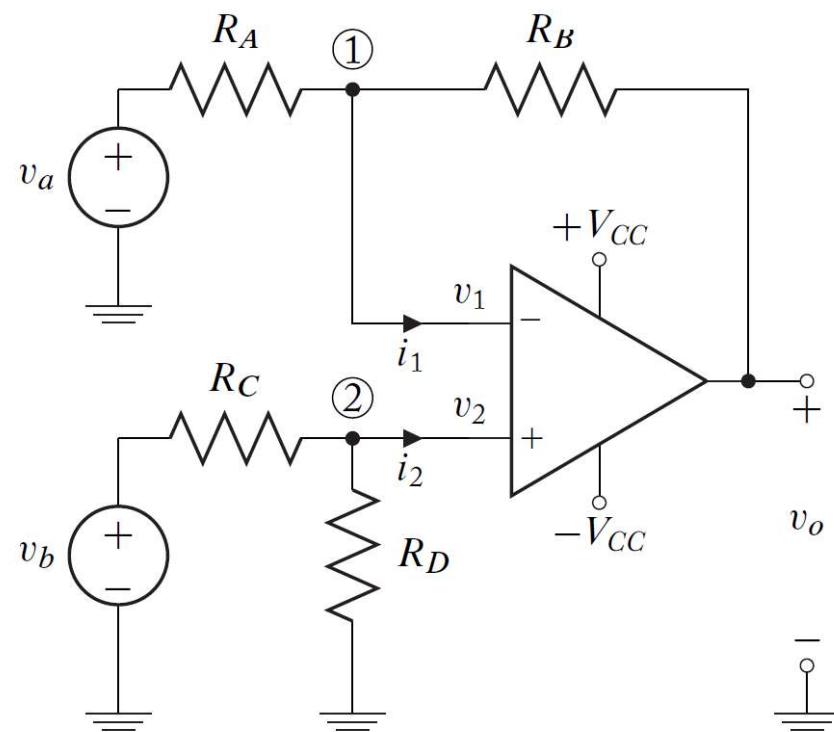


Example : Summing Amplifier

Non - Inverting Amplifier

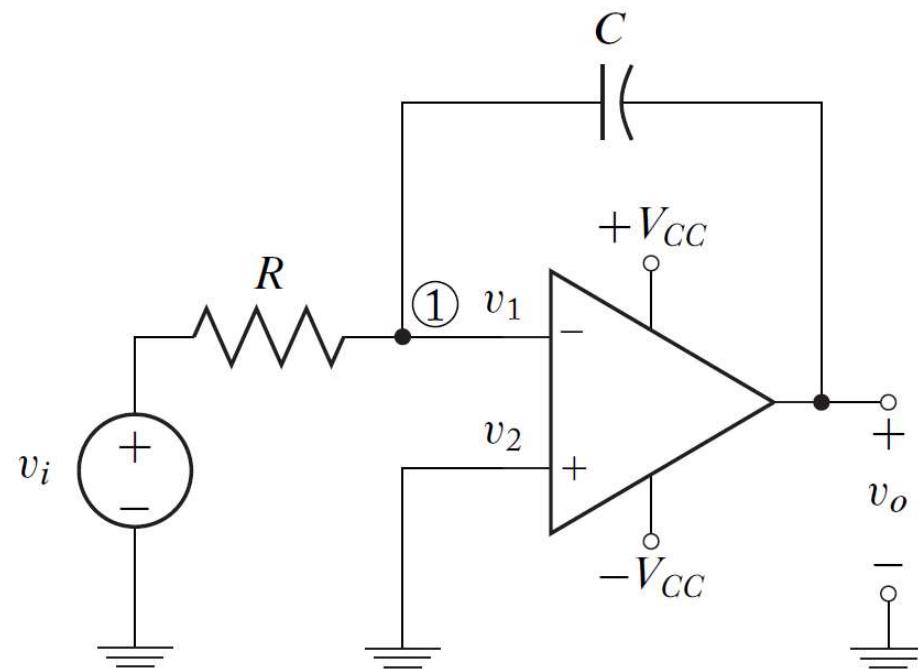


Difference Amplifier

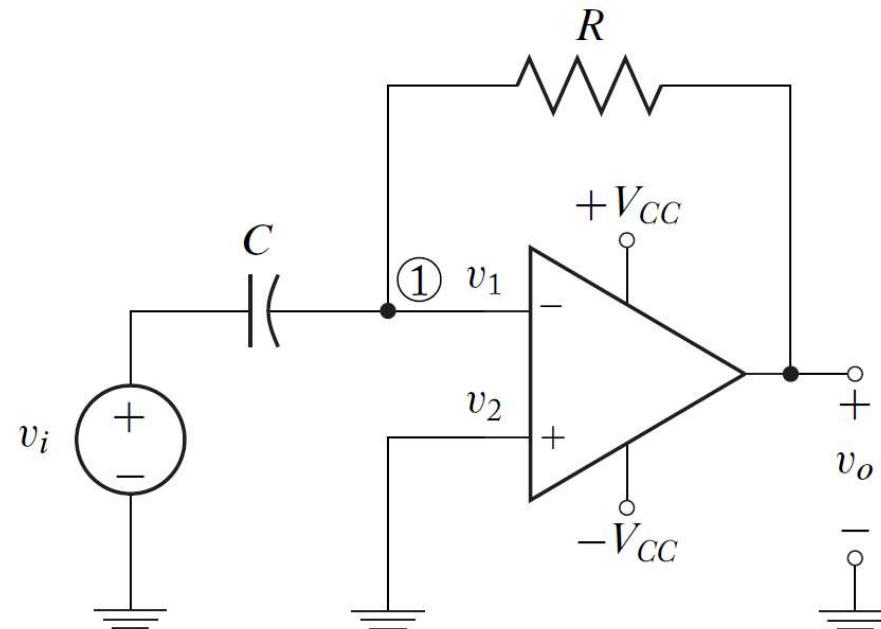


Example : Difference Amplifier

Integrator



Differentiator



Thank You