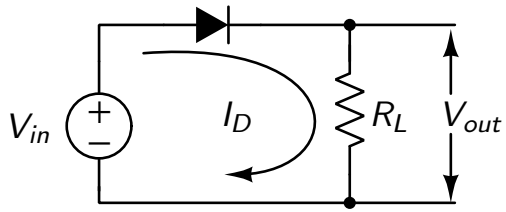
EE 101: Basic Electronics

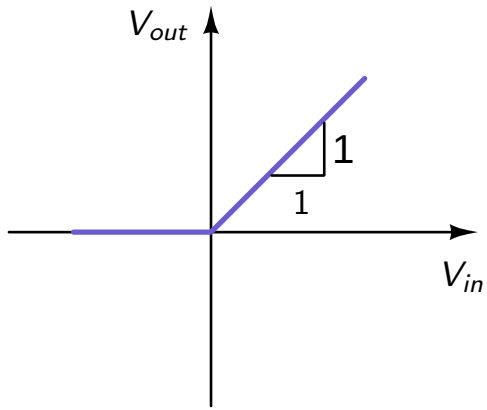
Applications of Diodes

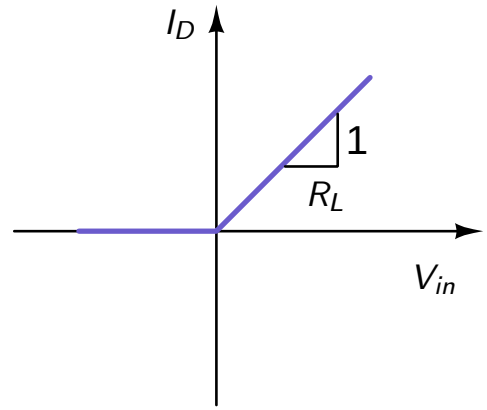
Nagarjuna Nallam

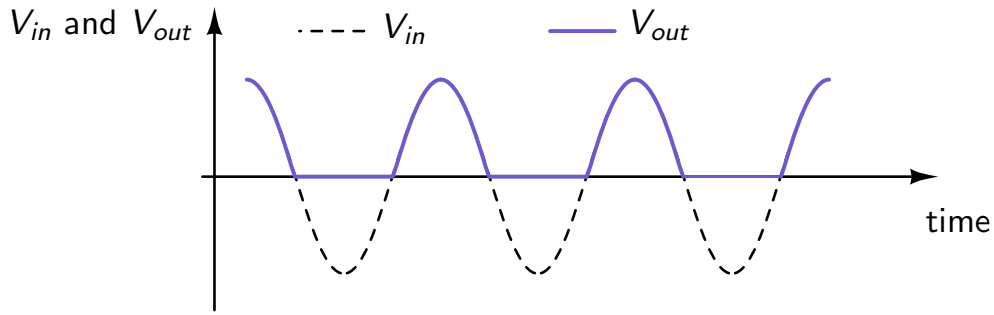
Department of EEE, IIT Guwahati, India

Half Wave Rectifier

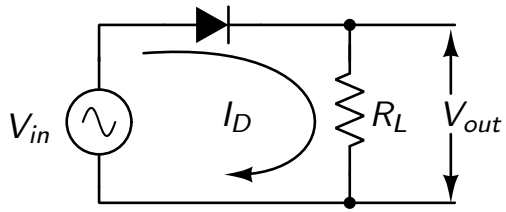


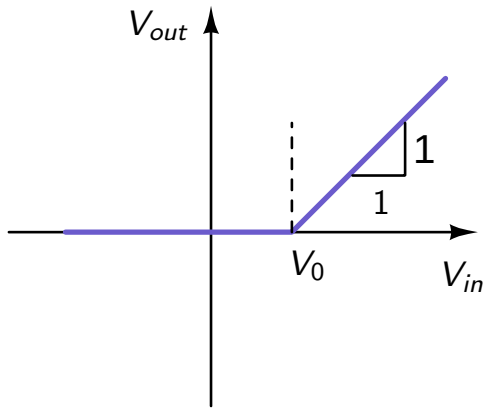


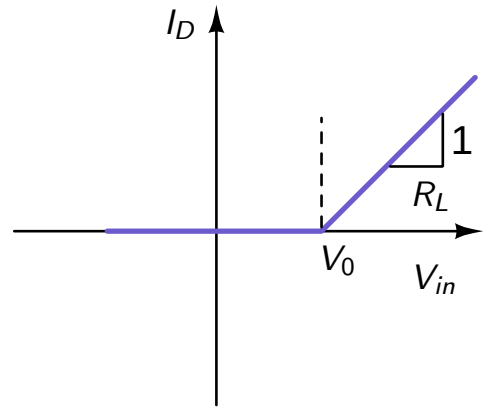


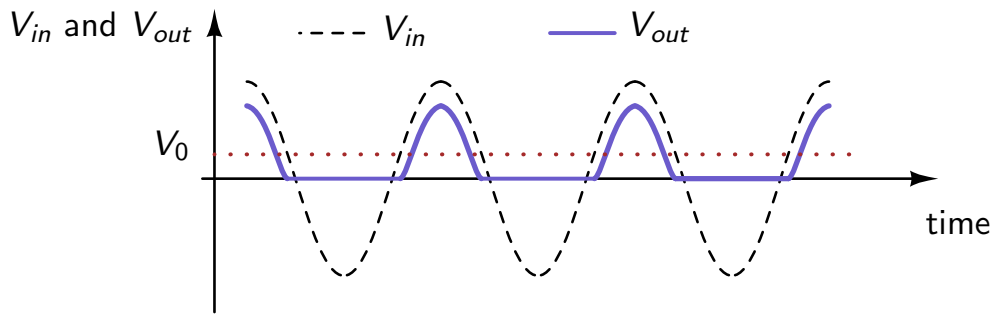


Half Wave Rectifier with a PN Diode

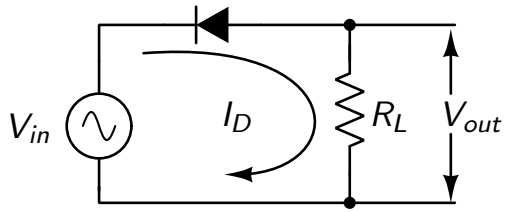


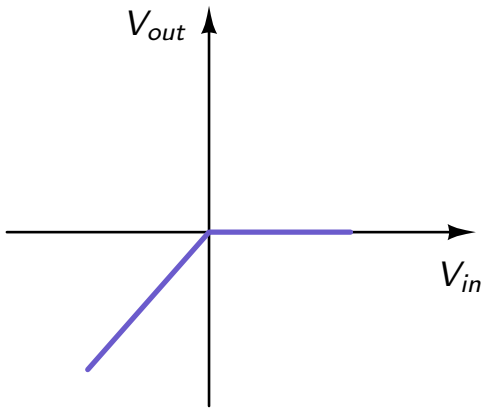


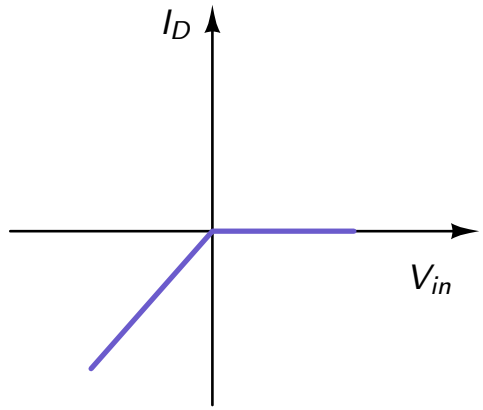


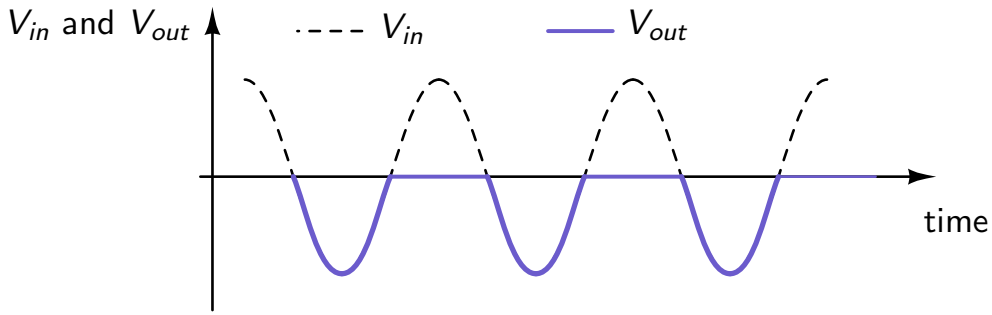


Half Wave Rectifier

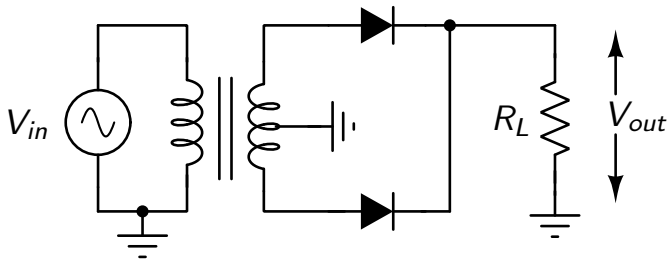


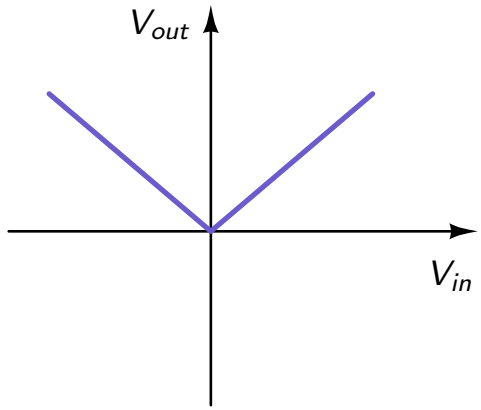


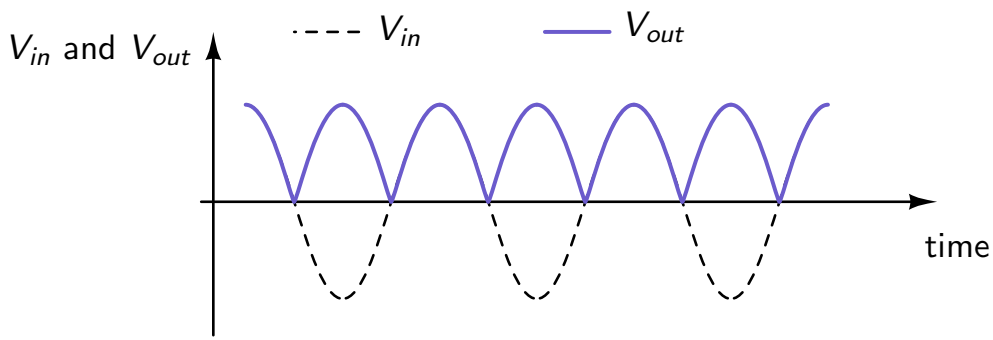




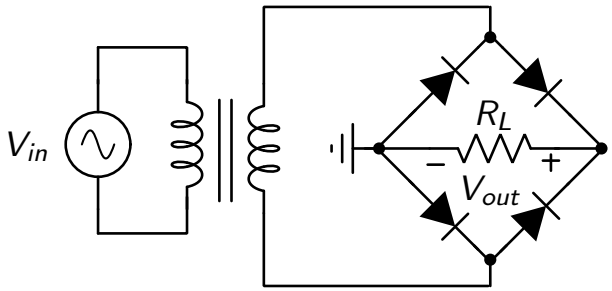
Full Wave Rectifier-1

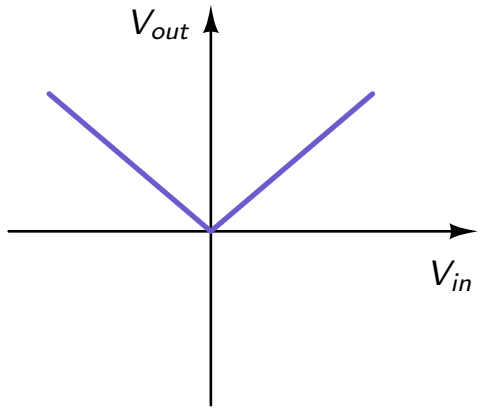


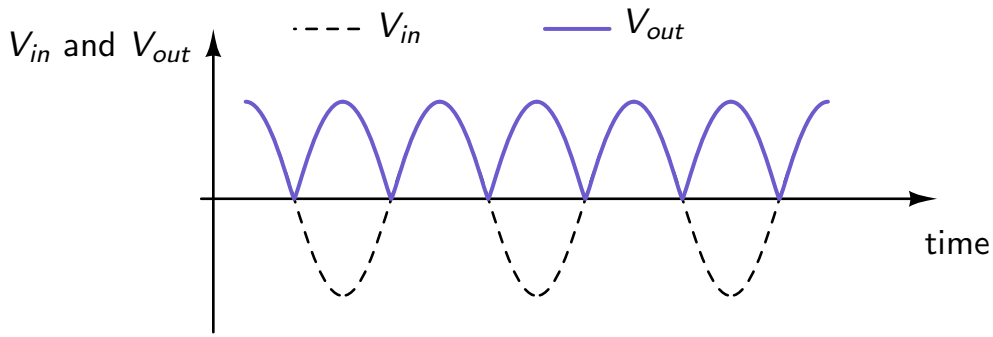




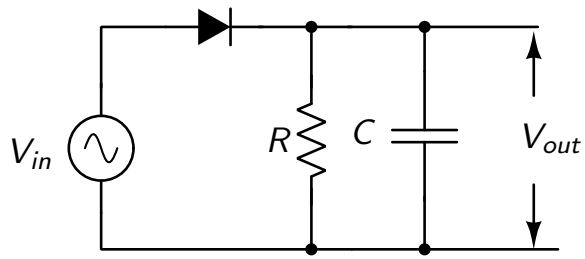
Full Wave Rectifier-2

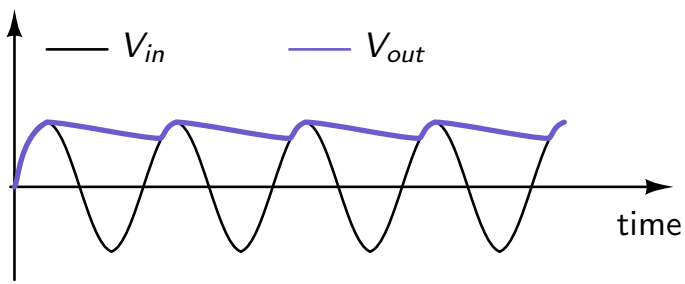






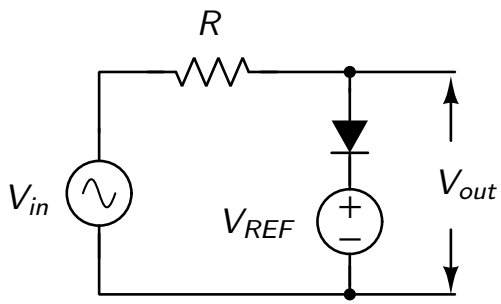
Peak Detector (AM Demodulator)

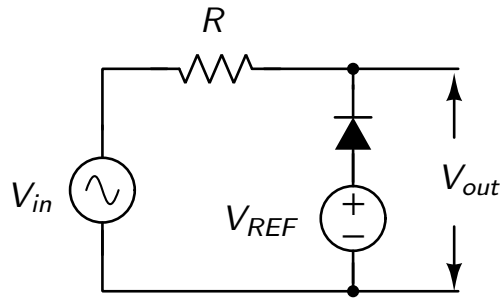


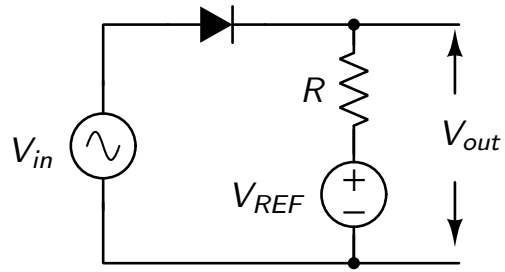


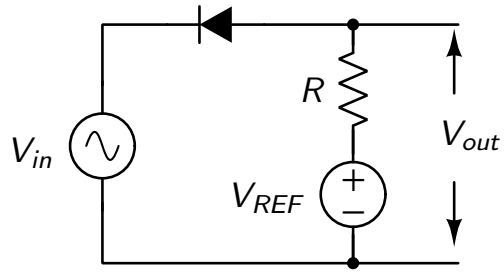
Only when $RC \gg$ Time period of the input voltage

Clippers

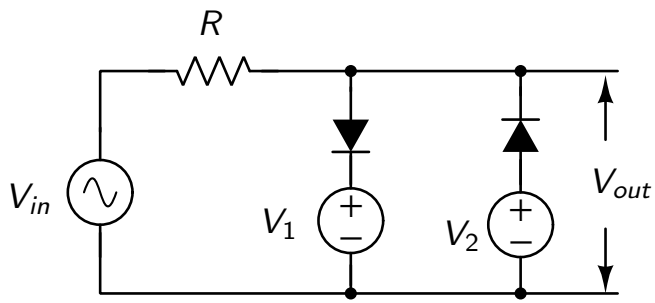




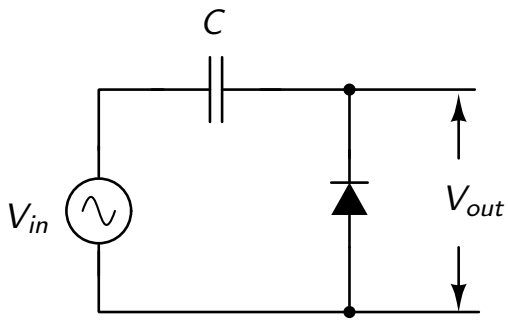


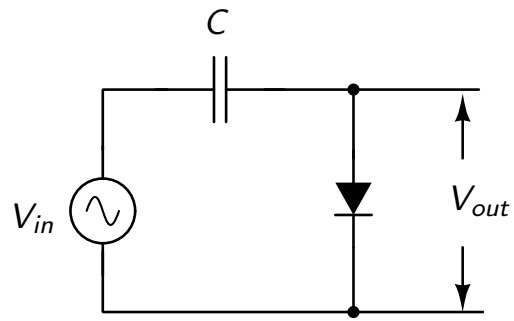


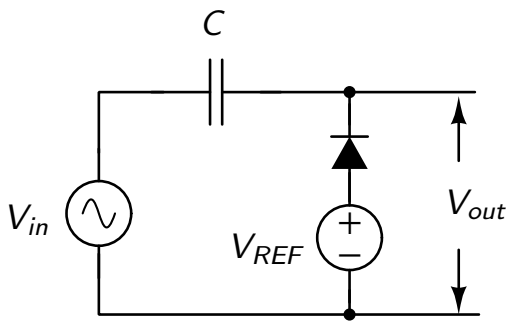
Two-sided Clipper

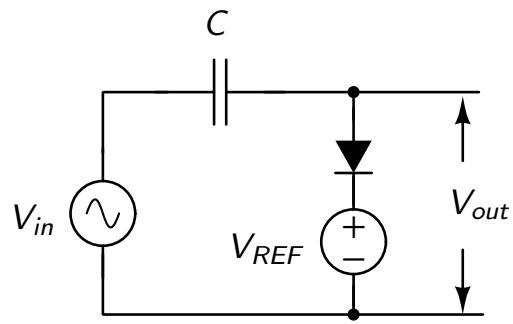


Clampers

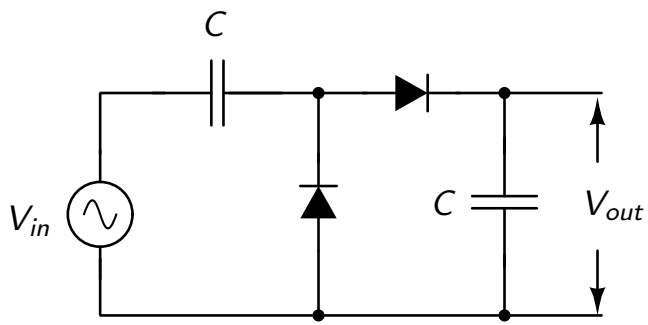




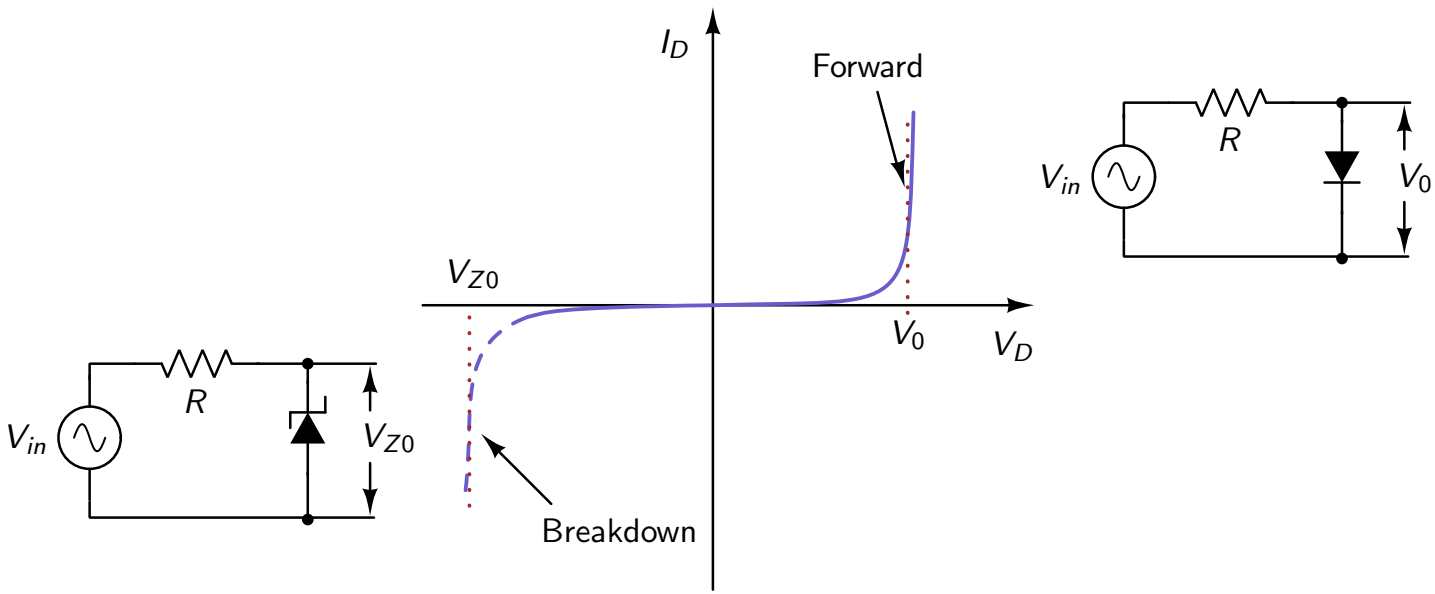




Voltage Doubler

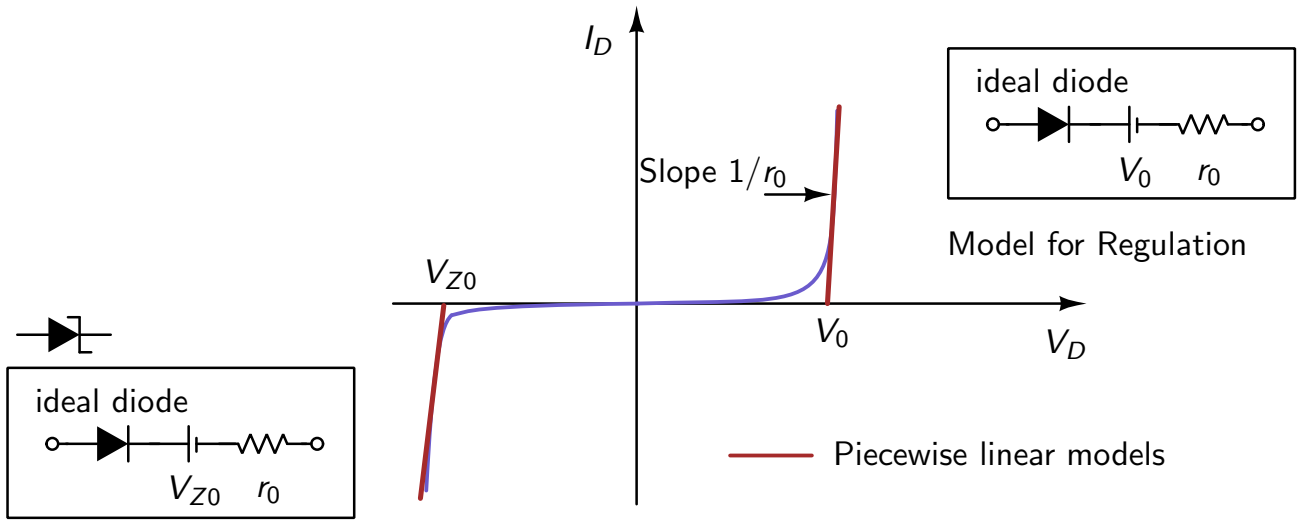


Voltage Regulation using Diodes



Zener diode: has low reverse breakdown voltage

Piecewise Linear Models



$$\text{Line Regulation} = \frac{\Delta V_{Load}}{\Delta V_{IN}}$$

$$\text{Load Regulation} = \frac{\Delta V_{Load}}{\Delta I_{Load}}$$

Summary

- Rectifiers
- Clippers
- Clampers
- Peak Detector
- Voltage doubler
- Voltage regulators

Reference Book

[1] A. Sedra and K. C. Smith, "Microelectronic Circuits," 6th Ed., Oxford university press, 2011.