A (Brief) Overview of RLC Circuits, Voltage, and Damping

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What is an RLC?

- Resistor, Inductor, Capacitor
- 2nd order linear system
- Like an LC circuit, but with resistance

Background: Uses of RLCs

- Modeling complex electrical circuits
- Voltage magnification
- Oscillator circuits
- Tuning

Different Dampings

Underdamped

Small resistance; leads to a decaying sine

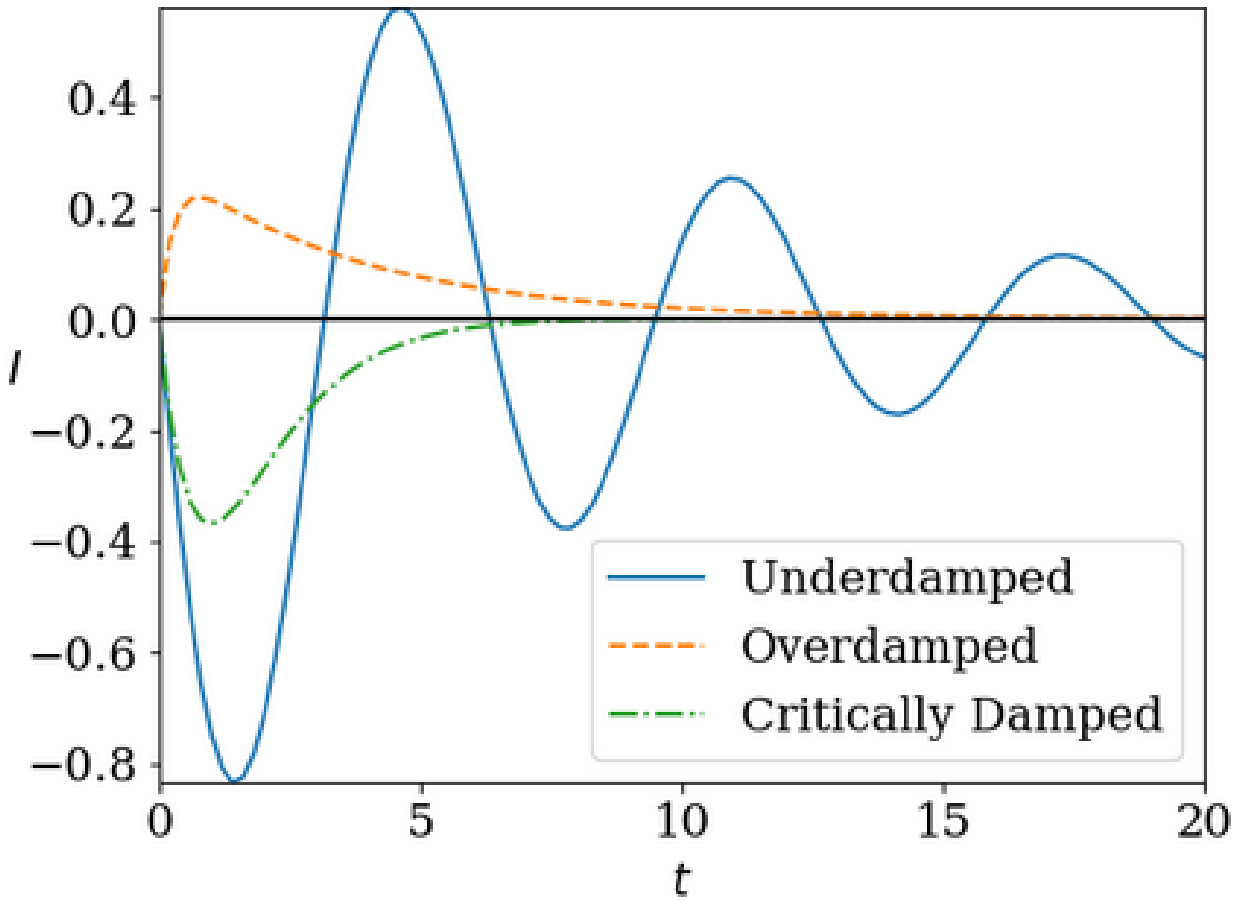
Critically Damped

Fastest transition; leads to the sum of two decaying exponentials

Overdamped

No oscillation in transient response; equal to t times a decaying exponential

Graph: Damping



References

Cadence PCB Solutions (). What Is the Time Constant of an RLC Circuit?. https://resources.pcb.cadence.com/blog/2020-what-is-the-time-constant-of-an-rlc-circuit

Ling, S. (n.d.). 43.2 Damping by Resistance. http://www.physicsbootcamp.org/Damping-by-Resistance.html

McAllister, W. (n.d.). RLC natural response - variations. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic/ee-natural-and-forced-response/a/ee-rlc-natural-response-variations