techkeen · Jan 18 · 2 min read

Current

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TL;DR Current is represented by *I*, in units of *A* (Amps). It is the flow of charges from one point in the circuit to another.

For a long time, I had a hard time keeping *I* (current) and *a* (amperes) straight. It was not until I was trying to explain the difference to a friend that I realised I had no idea how I would explain it. This upset me; I believe you have not fully learned something until you can explain it in multiple ways. If you have ever spoken to me, you might have noticed I tend to explain most things in multiple ways. The way I see it is that if the *explainee* misunderstands the first attempt, maybe a subsequent explanation will help them to comprehend.

To quote my textbook:

> When charges particles are tranferred through a given two-dimensional surface (such as the cross section of a conductor) , the net time-rate of transference of charge is referred to as the flow of current. Frequently , especially in solid-state phenomena, charge may be transferred by the movement of both positively charged particles and negatively charged ones. Thus it is important to keep in mind the fact that current refers to the net transference of

> Ampere (abbreviated A) . It is the transference of one coulomb of charge per second. We will use the literal symbol i (t) for current.

> (Basic Circuit Theory (Third Edition) , 2017, page 4.)

Current

If the following information confuses you, I would suggest you review Ohm's Law. (Link needed)

Current: The flow of charges from one point to another.

Current is represented by *i* (lower or upper case, see notes below);
The unit of measure is *A* (Amperes, Amps).

After some consideration, I came to the realisation that the issue was not really keeping them apart, but rather that the symbol *i does not mean impedance*.

[Electrical] Impedance: Represented by Z;
Resistance when controlled by a frequency.

Repeat to yourself, "I, current, am not Z, impedance".

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I != Z;            //I, current, am not Z, impedance
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Symbolism

I	Uppercase	
i	Lowercase	
i(t)	Lowercase	Time-variant

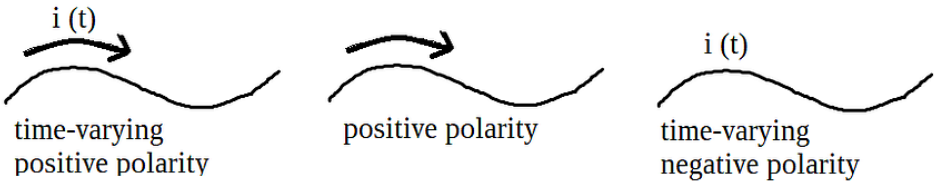
AC and DC current

AC	alternating current	~	i or i(t)
DC	direct current	--	I

For more in-depth notes, check out my theory note AC vs DC, or for the history, Edison vs Tesla.

Polarity Reference Direction

In short,



The first example is the correct reference polarity direction for i (t);

« During the time indicated, the actual net current flow in the conductor is from left to right (as indicated by the movement of negatively charged particles from right to left) »

So the variable *i (t)* is positive at this given instant of time, then the current flow must be in the direction indicated by the reference arrow.

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technicallyKeen

techkeen@outlook.com