Electric current formula

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Electric current is defined to be the rate at which charge flows. A large current, such ...

(1775-1836),,?? 1820~1827,"" ? ?

In the International System of Units (SI), electric current is expressed in units of ampere (sometimes called an "amp", symbol A), which is equivalent to one coulomb per second. The ampere is an SI base unit and electric current is a base quantity in the International System of Quantities (ISQ).[4]: 15 Electric current is also known as amperage and is measured using a device called an ammeter.[2]: 788

Electric currents create magnetic fields, which are used in motors, generators, inductors, and transformers. In ordinary conductors, they cause Joule heating, which creates light in incandescent light bulbs. Time-varying currents emit electromagnetic waves, which are used in telecommunications to broadcast information.

The conventional symbol for current is I, which originates from the French phrase intensit? du courant, (current intensity).[5][6] Current intensity is often referred to simply as current.[7] The I symbol was used by Andr?-Marie Amp?re, after whom the unit of electric current is named, in formulating Amp?re"s force law (1820).[8] The notation travelled from France to Great Britain, where it became standard, although at least one journal did not change from using C to I until 1896.[9]

A flow of positive charges gives the same electric current, and has the same effect in a circuit, as an equal flow of negative charges in the opposite direction. Since current can be the flow of either positive or negative charges, or both, a convention is needed for the direction of current that is independent of the type of charge carriers. Negatively charged carriers, such as the electrons (the charge carriers in metal wires and many other electronic circuit components), therefore flow in the opposite direction of conventional current flow in an electrical circuit.[10][11]

where I is the current through the conductor in units of amperes, V is the potential difference measured across the conductor in units of volts, and R is the resistance of the conductor in units of ohms. More specifically, Ohm"s law states that the R in this relation is constant, independent of the current.[16]

In alternating current (AC) systems, the movement of electric charge periodically reverses direction. AC is the form of electric power most commonly delivered to businesses and residences. The usual waveform of an AC power circuit is a sine wave, though certain applications use alternative waveforms, such as triangular or square waves. Audio and radio signals carried on electrical wires are also examples of alternating current. An important goal in these applications is recovery of information encoded (or modulated) onto the AC signal.

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In contrast, direct current (DC) refers to a system in which the movement of electric charge in only one direction (sometimes called unidirectional flow). Direct current is produced by sources such as batteries, thermocouples, solar cells, and commutator-type electric machines of the dynamo type. Alternating current can also be converted to direct current through use of a rectifier. Direct current may flow in a conductor such as a wire, but can also flow through semiconductors, insulators, or even through a vacuum as in electron or ion beams. An old name for direct current was galvanic current.[17]

Natural observable examples of electric current include lightning, static electric discharge, and the solar wind, the source of the polar auroras.

Man-made occurrences of electric current include the flow of conduction electrons in metal wires such as the overhead power lines that deliver electrical energy across long distances and the smaller wires within electrical and electronic equipment. Eddy currents are electric currents that occur in conductors exposed to changing magnetic fields. Similarly, electric currents occur, particularly in the surface, of conductors exposed to electromagnetic waves. When oscillating electric currents flow at the correct voltages within radio antennas, radio waves are generated.

In electronics, other forms of electric current include the flow of electrons through resistors or through the vacuum in a vacuum tube, the flow of ions inside a battery, and the flow of holes within metals and semiconductors.

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