

Chambers Dictionary of Science and Technology



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Chambers Dictionary of Science and Technology

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Chambers

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has applications both to magnetic fields in space and to the possibility of generating electricity. If the free electrons in a plasma or high-velocity flame are subjected to a strong magnetic field, then the electrons will constitute a current flowing between two electrodes in a flame. Abbrev *MHD*. See panel on *AERODYNAMICS*.

magneto-ignition (*ElecEng*) An ignition system for internal-combustion engines in which the voltage necessary to produce the spark is generated by a magneto.

magneto-ionic (*Phys*) Said of components of an electromagnetic wave passing through an ionized region and divided into ordinary and extraordinary waves by the magnetic field of the Earth.

magnetometer (*Surv*) Any instrument for measurement either of the absolute value of a magnetic field intensity, or of one component of this, eg horizontal component magnetometer for Earth's magnetic field. See *PROTON-PRECESSIONAL MAGNETOMETER*.

magnetomotive force (*Phys*) Line integral of the magnetic field intensity round a closed path. Abbrev *mmf*.

magneton (*Phys*) See *BOHR MAGNETON*.

magneto-optical disk (*ImageTech*) A reusable *VIDEO DISK*, recorded by a laser operating in a magnetic field that produces a magnetic signal in the surface coating which, during playback, varies the axis of polarization of the laser beam as it is reflected, these differences being detected to reproduce the signal (see *KERR EFFECT*). Abbrev *MO disk*.

magneto-optical effect (*Phys*) See *FARADAY EFFECT*, *KERR EFFECT*.

magneto-optic rotation (*Chem*) See *MAGNETIC POLARIZATION*.

magnetophone (*Acous*) Any recording device involving the magnetization of a medium, eg magnetic tape.

magnetoplasma dynamic generator (*ElecEng*) A device which produces electrical energy from an electrically conducting gas (plasma) flowing through a transverse magnetic field. Abbrev *MPD generator*. Also *magnetohydrodynamic generator*.

magnetoresistance (*ElecEng*) The resistivity of a magnetic material in a magnetic field which depends on the direction of the current with reference to the field. If parallel to one another, the resistivity increases, but if mutually perpendicular, it decreases.

magnetoresistive (*Eng*) A material, a metal or semiconductor, that exhibits a change in electrical resistance when subjected to a magnetic field.

magnetosphere (*Astron*) The asymmetrically shaped volume round the Earth and other magnetic planets in which charged particles are subject to the planet's magnetic field rather than the Sun's. Its radius is least towards the Sun and greatest away from it.

magnetostatics (*Phys*) The study of steady-state magnetic fields.

magnetostriction (*Phys*) A phenomenon of elastic deformation of certain ferromagnetic materials, eg nickel, on the application of magnetizing force. Used in ultrasonic transducers and, formerly, in memory in computers.

magnetostriction loudspeaker (*Acous*) Loudspeaker based on the magnetostriction effect, in which the length of materials varies according to an impressed magnetic field. The diaphragm is driven by a nickel or rare earth rod in which magnetostrictive changes are induced by an embracing coil.

magnetostriction microphone (*Acous*) Inverse of a *MAGNETOSTRICTION LOUDSPEAKER*.

magnetostriction transducer (*ElecEng*) Any device employing the property of magnetostriction to convert electrical to mechanical oscillations, eg by using a rod clamped at its centre and passing ac through a coil wound around the rod. Also *magnetostrictor*.

magnetostrictive filter (*ElecEng*) A filter network which utilizes magnetostrictive elements, bars or rods, with their energizing coils.

magnetostrictive oscillation (*Phys*) Oscillation based on the principle of the alteration of dimensions of a bar of magnetic material when the magnetic flux through it is changed. Nickel contracts with an increasing applied magnetic field but iron expands in weak fields and contracts in strong fields. The mechanical oscillatory system, eg a bar clamped at its centre, can be coupled magnetically to an amplifier to maintain the oscillation, which may be in the audio-frequency range.

magnetostrictive reaction (*Phys*) The inverse magnetostrictive effect, ie a change in magnetization under applied stresses.

magnetostrictor (*ElecEng*) See *MAGNETOSTRICTION TRANSDUCER*.

magnetotaxis (*BioSci*) A tactic response to a magnetic field; in magnetotactic bacteria the Earth's magnetic field is used as a guide to 'up' and 'down' in deep sediment.

magnet pole (*ElecEng*) See *POLE PIECE*.

magnetron (*Electronics*) (1) A two-electrode valve in which the flow of electrons from a large central cathode to a cylindrical anode is controlled by crossed electric and magnetic fields; the electrons gyrate in the axial magnetic field, their energy being collected in a series of slot resonators in the face of the anode. Magnetrons, used mainly as oscillators, can produce pulsed output power at microwave frequencies, with high peak power ratings. Used in microwave and radar transmitters and microwave cookers. See *CAVITY MAGNETRON*, *CROSSED-FIELD TUBE*. (2) A low-pressure gas discharge in which magnetic fields (usually from permanent magnets) near one or more electrodes aid the confinement of electrons. Such discharges are often used for high-rate sputtering.

magnetron amplifier (*Electronics*) A high-power microwave amplifier using a magnetron in such a configuration that it is not self-oscillatory.

magnetron critical field (*Electronics*) That which would just prevent an electron emitted from the cathode with zero energy from reaching the anode at a given value of anode voltage.

magnetron critical voltage (*Electronics*) The voltage which would just enable an electron emitted from the cathode with zero velocity to reach the anode at a given value of magnetic flux density.

magnetron modes (*Electronics*) Different frequencies of oscillation corresponding to different field configurations and selected by interconnecting cavities in various ways to control their phase differences.

magnet steel (*Eng*) A steel from which permanent magnets are made. It must have a high remanence and coercive force. Steels for this purpose may contain considerable percentages of cobalt (up to 35%) as well as nickel, aluminium, copper, etc. See *PERMANENT MAGNET*.

magnetor (*ElecEng*) A second-harmonic type of magnetic modulator which uses a saturable reactor to amplify dc, or low alternating-frequency, signals.

magnet yoke (*ElecEng*) Sometimes applied to the whole of the magnetic circuit of an electromagnet (or transformer etc), but strictly should refer only to the part which does not carry the windings.

magnification (*MathSci*) In a conformal mapping, given by $w = f(z)$, the magnification varies from point to point but is the same in all directions at a given point. The linear magnification at a point z_0 is given by $|f'(z_0)|$ and the surface magnification by $|f'(z_0)|^2$.

magnification (*Phys*) The ratio of the size of the image to that of the object in an optical system where the object is plane and lies perpendicular to the axis of the system. Also *transverse magnification*. See *LONGITUDINAL MAGNIFICATION*, *MAGNIFYING POWER*.

magnification factor (*Phys*) See *Q*.

magnifier (*Radiol*) Any thermionic amplifier, esp one used for the amplification of audio frequencies.

magnifying power (*Phys*) The ratio of the apparent size of the image of an object formed by an optical instrument to