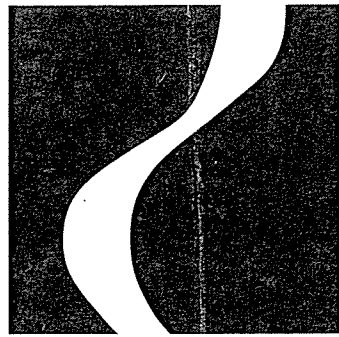


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Edited by
Christopher Morris



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modulated structure *Crystallography*. a crystal in which true three-dimensional lattice periodicity is lost but which can be described as an (imaginary) basic structure with space group symmetry combined with periodic deformation (modulation). The diffraction pattern gives information on each of these two components.

modulating codon see MODULATION CODON.

modulating electrode *Electronics*. in a cathode-ray tube, an electrode to which a potential is applied to control the magnitude of a beam current.

modulating signal *Telecommunications*. a wave that varies some characteristic of the carrier, such as the frequency, phase, or amplitude. Also, **modulating wave**.

modulation *Mechanical Engineering*. the process of regulating the air to fuel ratio in a burner for varying the load conditions on a boiler. *Telecommunications*. a process in which a characteristic of one wave is varied in accordance with the characteristic of another wave. *Molecular Biology*. a process of more frequent translation of particular sequences of messenger RNA.

modulation code *Telecommunications*. a code that causes variation in a given signal in accordance with a specific scheme; usually implemented in order to alter a carrier wave to transmit data.

modulation codon *Molecular Biology*. a codon that functions as a regulatory agent, coding for a rare tRNA and causing an interruption or a change in the rate of protein translation. Also, MODULATING CODON.

modulation crest *Telecommunications*. the maximum amplitude of an amplitude-modulated wave.

modulation-doped structure *Solid-State Physics*. a semiconductor heterostructure in which conduction electrons are spatially separated from their parent donor or acceptor impurity atoms.

modulation envelope *Telecommunications*. a curve drawn through the peaks of a graph that shows how the waveform of a modulated carrier depicts the waveform of the intelligence carried by the signal.

modulation factor *Telecommunications*. a mathematical formula for determining the percentage of modulation of an amplitude-modulated wave. The ratio of half the difference between the maximum and minimum amplitudes to the average amplitude is multiplied by 100.

modulation index *Telecommunications*. in frequency modulation with a sinusoidal modulating wave, the ratio of the frequency deviation to the frequency of the modulating wave. Also, RATIO DEVIATION.

modulation meter *Engineering*. a device that is used to measure the modulation of a modulated wave train, with readings expressed as a percentage.

modulation rise *Electronics*. an increase of the modulation percentage due to nonlinearity of a tuned amplifier; usually, the last intermediate-frequency stage of a receiver.

modulation spectroscopy *Spectroscopy*. the measurement and analysis of changes in transmittance or reflectance spectra induced by an externally applied perturbation, such as a magnetic field or a change in pressure.

modulation transformer *Acoustical Engineering*. an audio-frequency transformer used for matching impedances and transmitting such frequencies to the output stage of an audio amplifier.

modulation with a fixed carrier *Telecommunications*. phase modulation with a pilot carrier.

modulator *Electronics*. a circuit or device that varies some characteristic of a carrier signal in accordance with the waveform of a modulating signal. *Biochemistry*. see EFFECTOR.

modulator crystal *Optics*. a crystal that modulates light by electro-optic or magnetic effects, most commonly a Pockels cell.

modulator-demodulator see MODEM.

modulator glow tube *Electronics*. a cold-cathode recorder tube used for facsimile and sound-on-film recording to provide a modulated high-intensity point-of-light source.

module [mäj'äl; mäj'ool] a distinct unit or component; specific uses include: *Engineering*. any of various standards or units of measurement used in building, design, and civil engineering. *Building Engineering*. a structural unit that is designed to be joined with others. *Space Technology*. one of the individual, self-contained units of a spacecraft, having a distinct function. *Electronics*. 1. an assembly of self-contained, interconnected components that constitutes an identifiable electronic device, instrument, or piece of equipment. 2. a complete subassembly of such a unit. *Computer Programming*. a discrete, logical component of a program. *Computer Technology*. 1. an interchangeable plug-in item containing electronic components that complete, enhance, or expand processing capability or memory capacity. 2. a single memory bank.

Mathematics. Let R be a ring. An (left) R -module is an additive abelian group A together with a (left) multiplication (sometimes called scalar multiplication) by members of R such that, for all $r, s \in R$ and all $a, b \in A$, (a) $r(a + b) = ra + rb$, (b) $(r + s)a = ra + sa$, and (c) $r(sa) = (rs)a$. If R has an identity element 1_R and if $1_R a = a$ for all $a \in A$, then A is said to be a unitary R -module. Right modules are similarly defined for scalar multiplication on the right. If R is a division ring (skew field), the module is called a vector space.

modulo *Mathematics*. a general term for the formation of congruence classes (a particular type of equivalence class) for a given modulus within an algebraic object. For example, if H is a subgroup of a group G , then two elements a and b of G are said to be congruent modulo H if $ab^{-1} \in H$; denoted $a \equiv b \pmod{H}$. In particular, if G is the integers under addition and the subgroup H consists of all multiples of a fixed integer m , then the resulting congruence classes are referred to as "the integers (mod m)" and the rules of modular arithmetic are used for computations. Two integers are said to be equivalent mod m if their difference is equal to a multiple of m .

modulo-N check *Computer Programming*. a procedure used to verify computational accuracy by repeating the calculations in modulo- N arithmetic and comparing remainders. Also, RESIDUE CHECK.

modulo-two adder *Computer Technology*. an electronic circuit that functions as an exclusive-or gate, returning a 1 if the inputs are different and a 0 if they are the same.

modulus [mäj'äl] *Mathematics*. 1. the number in a modular arithmetic. 2. the subgroup used to form congruence classes within an algebraic object. Also, **modulus of the congruence**. 3. given a complex number $a + bi$, the quantity $(a^2 + b^2)^{1/2}$. Also called the absolute value or absolute magnitude of the complex number. The modulus of a function of a complex variable is similarly defined. 4. the norm of a vector in Euclidean n -space. 5. the value k in the elliptic integral of the first kind

$$u = F(k, \phi) = \int_0^\phi (1 - k^2 \sin^2 \theta)^{-1/2} d\theta.$$

Denoted by $k = \text{modu}$. *Mechanics*. see MODULUS OF ELASTICITY.

modulus of compression see BULK MODULUS.

modulus of continuity *Mathematics*. a former way of expressing the relationship between ϵ and δ in the definition of (uniform) continuity. The modulus of continuity of a given function f on the interval $[a, b]$ is

$$g(\delta) = \sup\{|f(x_1) - f(x_2)| : |x_1 - x_2| < \delta \text{ and } a \leq x_1, x_2 \leq b\}.$$

modulus of deformation *Mechanics*. the modulus of elasticity of materials not having elastic proportionality.

modulus of distance see DISTANCE MODULUS.

modulus of elasticity *Materials Science*. the stress per unit elastic strain, expressed as a ratio between the stress placed on a material and the strain, or dimensional response to stress. The most commonly encountered modulus of elasticity is Young's modulus: $E = F(s, e) = F(A, \Delta L/L)$. The modulus of elasticity is a measure of the stiffness of a material. Also, ELASTIC MODULUS.

modulus of elasticity in shear see SHEAR MODULUS.

modulus of precision see INDEX OF PRECISION.

modulus of resilience *Mechanics*. the strain energy per unit volume that an elastic material will store in uniaxial stress at the material's elastic limit.

modulus of rigidity *Mechanics*. see SHEAR MODULUS.

modulus of rupture in bending *Mechanics*. the fictitious maximum stress in a bending member at failure, computed as though the member retained linear elasticity.

modulus of rupture in torsion *Mechanics*. the fictitious maximum shear stress in a twisting member at failure, computed as though the member retained linear elasticity.

modulus of the complex number see ABSOLUTE VALUE.

modulus of torsion see TORSIONAL MODULUS.

modulus of volume elasticity see BULK MODULUS.

modus ponens *Artificial Intelligence*. a rule of logical inference: if P is true and $P \rightarrow Q$, conclude Q . (From Latin; literally, "a method of putting in place.")

MODY maturity-onset diabetes of youth.

Moellerella *Bacteriology*. a genus of Gram-negative bacteria of the family Enterobacteriaceae that are found in human feces and may be associated with diarrhea.

Moeritheriidae *Paleontology*. a family of subungulate proboscidean mammals in the extinct suborder Moeritherioidea; the first of the elephants, tapir-sized, with canines that foreshadow the development of tusks in later genera; Eocene and Oligocene.