

GLOSSARY

acceleration -rate of change of velocity

accelerometer -instrument that directly measures acceleration. Used in impact testing and car crash studies.

accelerometry -measurement of acceleration by an accelerometer

accuracy -ability of an instrument or transducer to obtain the true measure of a quantity, same as validity in statistics

amplifier -device for increasing the magnitude of an analogue signal

amplify -increase a signal's magnitude, opposite of attenuate

analog -same as analogue

analogue -(a) a voltage varying signal (b) a continuous signal (c) opposite of digital, as in analogue signal vs. digital signal

analogue signal -a continuous electrical signal which has the same characteristics as another physical signal (e.g., force, pressure, acceleration)

analogue-to-digital (A/D) -process by which an analogue signal is converted to a digital one suitable as input to a digital computer or device

anthropometry -measurement of human physical dimensions and the relationships these measurements have with athletic performance

attenuate -reduce signal magnitude, opposite of amplify

biomechanics -science which studies the influence of forces on living bodies

body segment parameters -inertial or physical properties of body segments, especially mass, density, location of centre of mass or centre of gravity and moment of inertia

cinematography -(a) recording of images on film, (b) study of the factors which influence the quality of

recording of film images

concentric contraction -a contraction where the muscle force is directed towards the centre of the muscle, i.e., muscle shortens while contracting

contraction -in muscle, the state when it has been induced internal (neurally) or externally (electrically) to shorten, requiring neural or electrical stimulation and chemical energy, in the form of adenosine triphosphate (ATP) or creatine phosphate (CP), and producing an EMG signal and force in the tendon. Note muscle can shorten (concentric), lengthen (eccentric) or remain the same length (isometric) and still be in a state of contraction, however, a muscle can produce a force passively without being in contraction.

digital -numeric, can be represented by a number suitable for use by digital computers

digital-to-analogue (D/A) -process by which a digital signal can be converted to an equivalent analogue (voltage varying) signal

digitizer -device for converting positional information to digital form, usually associated with quantifying motion from filmed or videotaped images

direct dynamics -derivation of kinematics from forces and moments of force

distortion -any error introduced to an analogue signal, see amplitude, frequency, and phase distortion

dynamics -mechanics of bodies in motion, see inverse and direct dynamics

dynamometry -measurement of forces, moments of force, or power

eccentric thrust -an impulsive force with a line of action which does not pass through the centre of gravity of the body causing angular acceleration

eccentric contraction -a contraction where the muscle force is directed away from the centre of the muscle, i.e., muscle lengthens while contracting

electrocardiography (ECG or EKG) -recording of electrical potentials produced by cardiac muscles

electrogoniometer (elgon) -a goniometer which measures joint angles electronically, often consisting of a potentiometer with two armatures

electromyogram (EMG) -recording from an electromyograph

electromyograph -device for measuring the electrical potentials produced by skeletal muscles, usually consisting of a differential amplifier with high input impedance (10 MΩ) and high common mode rejection (>80 dB)

electromyography -recording of electrical potentials produced by skeletal muscles

ensemble -group of related data, especially temporally related, a history, a digitized signal

ergometer -device for measuring mechanical work or permitting human exercise (exercise machine), e.g., bicycle or rowing ergometers

ergometry -measurement of mechanical work

ergonomics -(a) study of factors influencing human work, (b) literally work economics, (c) "fitting the task to the worker"

event -unique instant in time, e.g., heel-strike in walking, ball contact in striking or impacting activities or the "catch" in rowing, etc.

goniometer -device for measuring joint angles, see electrogoniometer

inverse dynamics -computation of forces or moments of force from a body's kinematics and inertial properties

isokinetic contraction -(a) contraction of a joint where the joint angular speed is constant (b) (rarely) a contraction where the muscle shortens or lengthens at constant linear speed

isometric contraction -constant length contraction meaning a muscle contraction where the muscle has no appreciable change in its length

isotonic contraction -(a) a contraction of an excised (*in vitro*) muscle where the muscle contracts against a constant load (b) weight lifting, that is, a whole muscle (and joint) contraction against a constant load, such as a weight, barbell, or dumbbell (c) a contraction where a muscle contracts against an artificially produced constant load

kinematics -study of motion without regard to its cause(s), quantities of motion, e.g., velocity, speed, acceleration, angular displacement, etc.

kinesiology -science which studies the causes and effects of human motion

kinetics -study of the causes of motion, study of forces and moments of force and their characteristics,

such as, work, energy, impulse, momentum, power, etc.

linearity -ability of a transducer to produce an output signal that is directly proportional to the input amplitude -the closeness of the relationship between a transducer's input and output signals to a straight line fit as measured statically or at low frequency. Measured by Pearson's product-moment correlation coefficient (r) which is the same as a linear least-squares curve fit

mechanics -science which studies the influence of forces on bodies

moment -(a) perpendicular distance from a point to a line or surface, radius, moment arm, as in moment of force, moment of momentum, moment of inertia (b) short for moment of force

noise -any unwanted, random or systematic, component in a signal. Random noise, which is uncorrelated with the true signal, may be reduced by filtering or averaging. Systematic noise is caused by interference produced by external sources and may be reduced in a variety of ways including removal of the source of the interference or shielding.

normal -(a) perpendicular to a surface or line (b) perpendicular to tangential

normalize -a form of scaling involving division of a set of numbers by a factor such as body weight, cycle time, maximum force, etc.

oscilloscope -device for recording signals on cathode ray tubes (CRTs)

oscillograph -device for recording signals on paper, e.g., strip-chart or pen recorder, UV recorder

phase - period of time, e.g., swing phase, recovery phase

potentiometer -electronic device which permits variable resistance, used in elgons, amplifier controls, volume controls, etc.

precision -ability of device to produce the same measurement repeatedly, same as statistical reliability or repeatability

radial -in direction away from centre of radius of curvature of a path, direction perpendicular to transverse

refine -process of scaling or otherwise transforming digitized motion picture data to real units in a known frame-of-reference

rigid body -a group of particles occupying fixed positions with respect to each other, a theoretical

body which is undeformable and has fixed inertial properties

scale -alter the magnitude of a digital signal, multiplication by a constant, cf. normalize, refine

statics-mechanics of bodies at rest or uniform (constant linear) motion

strain -change in length divided by resting length, normalized deformation

stress -loading force per cross-sectional area, in kilopascals, normalized load force

tangent -(a) line which is perpendicular to the normal of a surface or curve (b) slope of a line or rise/run (c) tangent of an angle ($\tan \theta$), ratio of opposite to adjacent sides of a right triangle

tangential -direction that is parallel to the tangent line of curved path, perpendicular to the normal

telemetry -transmission of signals by radio signals

temporal -relating to time, in time domain

transducer -a device that is actuated by power from one system and supplies power, usually in another form, to a second system -a device which changes one form of energy to another. An input transducer converts a physical signal, such as, force, temperature, power, etc. to an electrical signal, usually voltage. An output transducer converts an electrical signal to a physical quantity, e.g. loud speakers, oscillographs and meters.

vector -mathematical expression possessing magnitude and direction, which add according to the parallelogram law, e.g., force, acceleration, displacement, but not finite rotations, cf. scalars

velocity -vector rate of change of displacement includes direction of motion