|  |
| --- |
| **Parallel Glossary of Space and Time for Classical Physics** |
| RA Gillmann, 2022-08-03 |
| **body** is a physical entity with position and extent. **event** is a physical occurrence with position, extent, and pointer. **position** consists of location in space and/or chronation in time. **pointer** is the stance or time. **motion of a body** is a continuous change of its position. **kinematics** is the study of bodies and events. **direction** is the position or chronation toward which a body moves. |
| **frame of reference** (frame) is a method to assign each event a unique position in a coordinate system of points in ℝ3. **observer** is a frame associated with a body. **frame of reference system** is a method to assign every *event* a unique position in a coordinate system of points in ℝ3 × ℝ. **Cartesian coordinates** of an event in ℝ3 × ℝ are either: *x*0**e**x0 + *x*1**e**x1 + *x*2**e**x2 + *x*3**e**x3 = (*x*0, *x*1, *x*2, *x*3) = (*t*, **x**) or *w*0**e**t0 + *w*1**e**t1 + *w*2**e**t2 + *w*3**e**t3 = [*w*0, *w*1, *w*2, *w*3] = [*s*, **w**], where *x*0 = *t* is the time pointer, *w*0 = *s* is the stance pointer, the other *x*i and *t*i are rectilinear coordinates, **x** is the vector of location in 3D space, and **w** is the vector of chronation in 3D time. **reciprocal addition** (or harmonic or parallel addition) is the reciprocal of the addend reciprocals; symbol ⊞. |
| *Space-Time Domain (3+1)* | *Time-Space Domain (1+3)* |
| **length frame** of an observer or body is a frame of reference at rest relative to it. **location** is a position (the coordinates) relative to a length frame; symbol **x**. **length space** (3D space) is the vector space of a length frame. | **duration frame** of an observer or body is a frame in standard motion relative to it. **chronation** is a position relative to a duration frame; symbol **t**. **duration space** (3D time) is the vector space of a duration frame. |
| **length** is a 3D space interval. **hodologe** (horologe odometer) measures a reference uniform motion by length. **stance** is the display on a hodologe. **metre** is the SI unit of length, distance, and stance. | **duration** is a 3D time interval. **stopwatch** measures a reference uniform motion by duration; a clock that can be started and stopped. **time** is the display on a stopwatch. **second** is the SI unit of time, distime, and duration. |
| **displacement** is a vector from one location to another in length space. **distance** is the magnitude of displacement. **traversed distance** is the distance covered by a motion in length space. **elapsed distance** is the distance covered by a reference motion. | **dischronment** is a vector from one time point to another in duration space. **distime** is the magnitude of dischronment. **traversed time** (distime) is the time covered by a motion in duration space. **elapsed time** (distime) is the time covered by a reference motion. |
| **punctaneous** event occurs in a single stance point. **simulstanceous** events all occur at the same stance; n. *simulstanceity*. **synstanceous** events occur at the same stances; vb. *synstancize*, to make *synstanceous*. **perstancial** events occur through stance. | **instantaneous** event occurs in a single time point. **simultaneous** events all occur at the same time; n. *simultaneity*. **synchronous** events occur at the same times; vb. *synchronize*, to make synchronous. **diachronic** events occur through time. |
| **speed** of a body is the time rate of change of location without regard to direction, Δ*x*/Δ*t*; *instantaneous speed* is the derivative of distance traversed with respect to time, d*x*/d*t*; symbol *v*; units of m/s, km/hr, etc. | **pace** (or inverse speed) is the stance rate of change of chronation without regard to direction, Δ*t*/Δ*x*; *punctaneous pace*, the derivative of distime with respect to stance: d*t*/d*x*; *pace* is from racing (cf *ritmo*); symbol *w*; units of s/m. |
| **velocity** is thetime rate of displacement, Δ**x**/Δ*t*; *instantaneous velocity* is the derivative of displacement with respect to time, d**x**/d*t*; symbol**v**; from Latin *velocitas*, rapidity. | **lenticity** (len·tic′·i·ty) (or inverse velocity) is thestance rate of dischronment, Δ**t**/Δ*x*; *punctaneous lenticity* is the derivative of dischronment with respect to stance, d**t**/d*x*; symbol**w**; from Latin *lentus*, slow. |
| **time mean speed or velocity** is the arithmetic mean of speeds or velocities with a time value in common. **space mean speed or velocity** is the harmonic mean of speeds or velocities with a length value in common. | **space mean pace or lenticity** is the arithmetic mean of paces or lenticities with a length value in common. **time mean pace or lenticity** is the harmonic mean of paces or lenticities with a time value in common. |
| **acceleration** is the change of velocity per unit of duration; verb *accelerate*; negative is *decelerate*; zero is *unaccelerated*; *instantaneous acceleration* is d**v**/d*t*; units of m/s²; symbol **a**. | **relentment** is the change of lenticity per unit of length; verb *relent*; negative is *derelent*; zero is *unrelented*; *punctaneous relentment* is d**w**/d*x*; units s/m²; symbol **b**; from *re-* + Latin *lentus*, slow. |
| **arc length** is the length along a curve. **length scale** (or distance sc.) is a ratio of map length *vs* actual length. **isodistance line** shows*equidistant*events. | **arc duration** is the duration along a curve. **time scale** (or duration sc.) is a ratio of map time *vs* actual time intervals. **isochron line** shows *equiduration* events. |
| **circular motion:** space circle S = wavelength*λ*= 1/*h* = *μ*/*w* =*v*/*f*; circular arc *s*; space radius R; (spatial) angle *θ* = *s*/R; frequency *f* = 1/T = *v*/*λ*; angular velocity *v* = S/T = *λf*; if S = 1, then *v* = *f*; if R = 1, then *v* = *ω* = 2π*f* = *θ*/*t*. | **cyclic motion:** time period T = wavetime *μ* **=** 1/f = *λ*/*v* =*w*/*h*; rotation time *t*; time radius Q; turn angle *ϕ* = *t*/Q; periodicity *h* = 1/S = *w*/*μ*; angular lenticity *w* = T/S = *μh*; if T = 1, then *w* = *h*; if Q = 1, then *w* = *κ* =2π*h* = *θ*/*s*. |
| **inertia** is the resistance of a body to any change in its state of motion. **inertial frame** (or system) has bodies without external forces move with uniform velocity.  | **facilia** is the nonresistance of a body to a change in its state of motion; Latin for *easy*. **facilial frame** (or system) bodies without external releases move with uniform lenticity.  |
| **mass** is a measure of a body’s inertia; the resistance of a body to a change in its condition of motion as a net force is applied; inverse of *vass*; units of kg; symbol *m*. **matter** is a body with*mass*that occupies a space; a measure of the energy content of a body. **particle** is a material point with mass and temporal extension. | **vass** measures a body’s facilia; nonresistance of a body to a change in its condition of motion as a net *release* is applied; inverse of mass; from (in)*v*(erse) (m)*ass*; units of kg−1; symbol *n*. **carrier** is a body with*vass*that fills a *time*; a measure of the lethargy content of a body. **tempicle** is a material time point with vass and spatial extension. |
| **moment** is the product of a physical quantity such as mass or force and its length from/to a space point/axis. **momentum** (linear) is the*mass*times the *velocity*; the time rate of change of the mass-length moment; plural, *momenta*; units in kg m s−1; symbol **p** = *m***v**. | **punctum** is the product of a physical quantity such as*vass* or *release* and its time from/to a time point. **levamentum** is the inverse momentum,*vass*times the *lenticity*; the space rate of change of the vass-time punctum; plural, *puncta*; Latin, point; units of kg−1 s m−1; symbol **q** = *n***w**. |
| **force** is the agency that tends to change the momentum of a body; time rate of change of*momentum*; units in newtons, N = kg m s−2; symbol **F** ≡ d**p**/d*t*, e.g., *m***a**. | **release** is the agency that tends to change the levamentum of a body; space rate of change of*levamentum*; units in *oldtons*, O = kg−1 s m−2; symbol**R**≡d**q**/d*x*, e,g., *n***b**. |
| **impulse** is a force **F** applied over a time d*t*, or the change in momentum; units N·s; symbol **J** ≡ **F**·d*t* = d**p**. **work** is a force **F** applied over a displacement **x**:*W*≡ **F**· **x**; for a constant force: *W = F* d*x* = *P* d*t*; units: J = N·m. | **peel** is a*release* **G** applied over a length d*x*or change in *levamentum*; units O·m; symbol **K** ≡ **R**·d*x* = d**h**. **repose** (inverse of work) is a release **R** applied over a *dischronment* **t**: *Z* ≡**R**·**t**; for a constant *release*: *Y = R* d*t* = *Q* d*x*; units O·s. |
| **power** is the time rate of work done:*P*≡d*W*/d*t* = **F** ·**v**; units: Watt, W = J/s = N·m/s. **energy**:the capacity for doing work; units, J≡N·m = W·s; symbol *E*; energy is conserved over time. **kinetic energy** KE = ½*m***v**². | **placidity** is the space rate of repose effected:*Q*≡ d*V*/d*x* = **R**·**u**; units: 1/J·m = O·s/m. **lethargy** is the capacity for repose; units, 1/J≡O·s; symbol *D* = 1/*E*; lethargy is conserved over distance. **kinetic lethargy** KL = ½*n***w**². |
| **centre of mass** (or*barycentre*) is the normalized moment of mass; **M** = Σi **r**i *m*i/Σi *m*i. **moment of inertia** is the second moment of mass; *I* ≡ Σi *r*i2*m*i. | **centre of vass** (or*elaphrocentre*) is the normalized punctum of vass; **N** = Σi **t**i *n*i/Σi *n*i. **punctum of facilia** is the second punctum of vass; *J* ≡ Σi *t*i2*n*i. |
| **gravitation** is the mutual force that all bodies have, which is directed toward the mutual centre of mass. **weight** is the force exerted on a body by gravity. | **levitation** is the mutual*release*that all bodies have, which is directed toward the mutual centre of *vass*. **levage** is the *release* exerted on a body by *levity* (from French). |
| **angular momentum** for a particle space point is the moment of momentum, **L** ≡ **r** × **p**, the cross product of the particle's location vector, **r**, and its momentum vector, **p** = *m***v**. | **angular levamentum** for atempicle time pointis the punctum of levamentum, **Γ** ≡ **t** × **h**, the cross product of the tempicle's *chronation* vector,**t**, and its *levamentum* vector,**h**= *n***w**. |
| **torque** is the moment of force; the rate of change of angular momentum, **τ** *=* I**α** = **r** × **F**; units: N·m. | **strophence** is the punctum of release; the rate of change of angular *levamentum*, **σ** *=* I**β** = **t** × **R**; from Greek *strophe*, turn + (e)*nce.* |