Arc Length For Parametric Equations

In the case of a single parameter, parametric equations are commonly used to express the trajectory of a moving point. For this case, the parameter is often, but not necessarily, time, and the point describes a curve, called a parametric curve. In the case of two parameters, the point describes a surface, called a parametric surface. In all cases, the equations are collectively called a parametric representation, or parametric system, or parameterization (also spelled parametrization, parametrisation) of the object. a2fde148d7 "Mylar balloon" is the name for the figure given by W. Paulson, who first investigated the shape. The term was subsequently adopted by other writers. "Mylar" is a trademark of DuPont. a2fde148d7 parametrisation or a2fde148d7 Two levels of abstraction are employed in the definitions of latitude and longitude. In the first step the physical surface is modeled by the geoid, a surface which approximates the mean sea level over the oceans and its continuation under the land masses. The second step is to approximate the geoid by a mathematically simpler reference surface. The simplest choice for the reference surface is a sphere, but the geoid is more accurately… a2fde148d7 Parametrization may refer more specifically to: a2fde148d7 == Definition == a2fde148d7

Curve In this article, these curves are sometimes called topological In mathematics, a curve (also called a curved line in older texts) is an object similar to a line, but that does not have to be straight. that defines the curve is called a parametrization, and the curve is a parametric curve a2fde148d7

== Background == a2fde148d7

Latitude The parametric latitude is not used in the theory of In geography, latitude is a geographic coordinate that specifies the north-south position of a point on the surface of the Earth or another celestial body. Latitude is given as an angle that ranges from −90° at the south pole to 90° at the north pole, with 0° at the Equator. \beta \,;} Cayley suggested the term parametric latitude because of the form of these equations. Latitude and longitude are used together as a coordinate pair to specify a location on the surface of the Earth. Lines of constant latitude, or parallels, run east-west as circles parallel to the equator a2fde148d7

It can be formalized mathematically for smooth curves using vector calculus and differential geometry, or for curves that might not necessarily be smooth as a smallest upper bound of lengths of polygonal chains. The curves for which this limit exists are called rectifiable curves, and the process of determining their arc length in this way is called curve rectification. a2fde148d7 Parametrization (atmospheric modeling), a method of approximating complex processes

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Parametric oscillator A simple example of a parametric oscillator is a child pumping a playground swing by periodically standing and squatting to increase the size of the swing's oscillations. The child's motions vary the moment of inertia of the swing as a pendulum. This changes moment of inertia A parametric oscillator is a driven harmonic oscillator in which the oscillations are driven by varying some parameters of the system at some frequencies, typically different from the natural frequency of the oscillator. The "pump" motions of the child must be at twice the frequency of the swing's oscillations. moving, the swing can also be parametrically driven by alternately standing and squatting at key points in the swing arc. Examples of parameters that may be varied are the oscillator's resonance frequency a2fde148d7

The positive portion of the generatrix of the balloon is the function z(x) where for a given generatrix length a: a2fde148d7

Parametric surface The curvature and arc length of curves on the surface, surface area, differential A parametric surface is a surface in the Euclidean space. and the divergence theorem, are frequently given in a parametric form a2fde148d7

Parameterization theorem or S mn theorem, a result in computability theory a2fde148d7

Parametrization Parametrization (geometry), the process of finding parametric equations of a curve, surface, etc. Parametrization by arc length, a natural parametrization of a curve Parametrization, also spelled a2fde148d7

Differentiable curve on the set of all parametric curves must be defined. The differential-geometric properties of a parametric curve (such as its length, its Frenet frame Differential geometry of curves is the branch of geometry that deals with smooth curves in the plane and the Euclidean space by methods of differential and integral calculus a2fde148d7

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Mylar balloon (geometry) The thickness τ is given by τ = 2 B r , {\displaystyle {\tau }=2Br,} while the generatrix length a is given by In geometry, a mylar balloon is a surface of revolution. }{2}})} from the parametric equations above. It resembles a slightly flattened sphere. While a sphere is the surface that encloses a maximal volume for a given surface area, the mylar balloon instead maximizes volume for a given generatrix arc length a2fde148d7

The shape is approximately realized by inflating a physical balloon made of two circular sheets of flexible, inelastic material - the eponymous example of which is a Mylar balloon. Perhaps counterintuitively, the surface area of the inflated balloon is less than the surface area of the circular sheets. This is due to physical crimping of the surface, which increases near the rim. a2fde148d7 ω a2fde148d7

Intuitively, a curve may be thought of as the trace left by a moving point. This is the definition that appeared more than 2000 years ago in Euclid's Elements: "The [curved] line is [...] the first species of quantity, which has only one dimension, namely length, without any width nor depth, and is nothing else than the flow or run of the point which [...] will leave from its imaginary moving some vestige in length, exempt of any width." a2fde148d7 parameterization, a2fde148d7

Parametric equation For this case, the parameter is often In mathematics, a parametric equation expresses several quantities, such as the coordinates of a point, as functions of one or more variables called parameters. the case of a single parameter, parametric equations are commonly used to express the trajectory of a moving point a2fde148d7

is the process of defining or choosing parameters. a2fde148d7 Parametrization by arc length, a natural parametrization of a curve a2fde148d7 The theory of curves is much simpler and narrower in scope than the theory of surfaces and its higher-dimensional generalizations because a regular curve in a Euclidean space has no intrinsic geometry. Any regular curve may be parametrized by the arc length (the natural parametrization). From the point of view of a theoretical point particle on the curve that does not know anything about the ambient space, all curves would appear the same. Different space... a2fde148d7 When the relation is a function, so that tangential angle is given as a function of arc length, certain properties become easy to manipulate. In particular, the derivative of the tangential angle with respect to arc length is equal to the curvature. Thus, taking the derivative of the Whewell equation yields a Cesàro equation for the same curve. a2fde148d7 == Definition == a2fde148d7 This definition of a curve has been formalized in modern mathematics as: A curve is the image of an interval to a topological space by a continuous function. In some contexts, the function that defines the curve is called a parametrization, and the curve is a parametric curve. In this article, these curves are sometimes called topological curves to distinguish them from more constrained curves such as differentiable curves. This definition encompasses most curves that are studied in mathematics; notable exceptions are level curves (which are unions of curves and isolated points), and algebraic curves (see below). Level... a2fde148d7 For example, the equations a2fde148d7 The concept is named after William Whewell, who introduced it in 1849, in a paper in the Cambridge Philosophical Transactions. In his conception, the angle used is the deviation from the direction of the curve at some fixed starting point, and this convention is sometimes used... a2fde148d7 x a2fde148d7 Parametrization (geometry), the process of finding parametric equations of a curve, surface, etc. a2fde148d7

Arc length It can be formalized mathematically for smooth curves using vector calculus and differential Arc length is the distance between two points along a curve. Arc length is the distance between two points along a curve a2fde148d7

Whewell equation If one curve is obtained from another curve by translation then their Whewell equations will be the same. These quantities do not depend on the coordinate system used except for the choice of the direction of the x-axis, so this

is an intrinsic equation of the curve, or, less precisely, the intrinsic equation. The Whewell equation of a plane curve relates the tangential angle (φ) with arc length (s), where the tangential angle is the angle between the tangent The Whewell equation of a plane curve relates the tangential angle (φ) with arc length (s), where the tangential angle is the angle between the tangent to the curve at some point and the x-axis, and the arc length is the distance along the curve from a fixed point a2fde148d7

Many specific curves have been thoroughly investigated using the synthetic approach. Differential geometry takes another approach: curves are represented in a parametrized form, and their geometric properties and various quantities associated with them, such as the curvature and the arc length, are expressed via derivatives and integrals using vector calculus. One of the most important tools used to analyze a curve is the Frenet frame, a moving frame that provides a coordinate system at each point of the curve that is "best adapted" to the curve near that point. a2fde148d7 On its own, the term latitude normally refers to the geodetic latitude as defined below. Briefly, the geodetic latitude of a point is the angle formed between the vector perpendicular (or normal) to the ellipsoidal surface from the point, and the plane of the equator. a2fde148d7