Definition

A *continuous-time time-invariant linear dynamical system* is a tuple (A, B, C, D) where $A \in \mathbf{R}^{n \times n}$, $B \in \mathbf{R}^{n \times m}$, $C \in \mathbf{R}^{k \times n}$ and $D \in \mathbf{R}^{k \times m}$. Given an *input* $u : \mathbf{R} \to \mathbf{R}^m$, it models a *state* $x : \mathbf{R} \to \mathbf{R}^n$ and *output* $y : \mathbf{R} \to \mathbf{R}^k$ by

$$\dot{x} = Ax + Bu,$$
$$y = Cx + Du.$$

Here Ax is called the *drift term* and Bu is called the input term (of $\dot{x}$).

Continuous-Time Linear Dynamical Systems with Inputs and Outputs

Autonomous Continuous-Time Linear Dynamical Systems

Real Matrices

Linear Equations

Real Vectors

Space Vectors

Plane Vector Sums and Differences

Linear Functions

Arrays

N-Dimensional Space

Plane Vectors

Distance

Differential Equations

Space Distance

Differentiable Functions

Plane Distance

Interval Length

Real Functions

Real Space

Intervals

Real Plane

Real Line

Integral Line

Real Order

Real Summation

Geometry

Rational Order

Real Numbers

Natural Summation

Rational Numbers

Lists

Integer Arithmetic

Set Numbers

Direct Products

Integer Products

Natural Multiplicative Identity

Natural Additive Identity

Finite Sets

Natural Equations

Integer Order

Comparisons

Integer Sums

Natural Powers

Arithmetic

Identity Elements

Equivalent Sets

Function Inverses

Family Operations

Family Unions and Intersections

Orders

Integer Numbers

Natural Products

Operations

Equations

Function Image

Function Composites

Families

Natural Order

Natural Sums

Converse Relations

Equivalence Relations

Functions

Recursion Theorem

Relations

Peano Axioms

Ordered Pair Projections

Natural Induction

Set Products

Natural Numbers

Set Powers

Generalized Set Dualities

Successor Sets

Unordered Triples

Intersection of Empty Set

Partitions

Set Symmetric Differences

Set Dualities

Set Unions and Intersections

Ordered Pairs

Pair Unions

Set Intersections

Set Complements

Set Differences

Set Unions

Pair Intersections

Unordered Pairs

Empty Set

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects