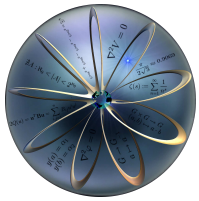

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autonomous system

Canonical name	AutonomousSystem
Date of creation	2013-03-22 13:37:26
Last modified on	2013-03-22 13:37:26
Owner	Daume (40)
Last modified by	Daume (40)
Numerical id	6
Author	Daume (40)
Entry type	Definition
Classification	msc 34A99
Synonym	autonomous
Synonym	autonomous equation
Synonym	nonautonomous
Synonym	nonautonomous equation
Related topic	TimeInvariant
Related topic	SystemDefinitions
Defines	nonautonomous system

A system of ordinary differential equation is *autonomous* when it does not depend on time *(does not depend on the independent variable)* i.e. $\dot{x} = f(x)$. In contrast *nonautonomous* is when the system of ordinary differential equation does depend on time *(does depend on the independent variable)* i.e. $\dot{x} = f(x, t)$.

It can be noted that every nonautonomous system can be converted to an autonomous system by adding a dimension. i.e. If $\dot{\mathbf{x}} = \mathbf{f}(\mathbf{x}, t)$ $\mathbf{x} \in \mathbb{R}^n$ then it can be written as an autonomous system with $\mathbf{x} \in \mathbb{R}^{n+1}$ and by doing a substitution with $x_{n+1} = t$ and $\dot{x}_{n+1} = 1$.