Ansatz

Ansatz (pronounced ['anzats], English: “onset”; today, “approach, setup, starting point”; plural: **Ansätze**) is a German noun with several meanings in the English language. It is widely encountered in physics and mathematics literature. Since ansatz is a noun, in German texts the initial a of this word is always capitalised.

Definition

More formally, in physics and mathematics, an ***ansatz*** is an educated guess that is verified later by its results. An ansatz is the establishment of the starting equation(s) describing a mathematical or physical problem. It can take into consideration boundary conditions. After an ansatz has been established, the equations are solved for the general function of interest. Typically, a word problem starts by writing down the ansatz with subsequent refinement leading to the solution of the problem.

Examples

Given a set of experimental data that looks to be clustered about a line, a linear ansatz could be made to find the parameters of the line by a least squares curve fit. Variational approximation methods use ansätze and then fit the parameters.

Another example could be the mass, energy, and entropy balance equations that, considered simultaneous for purposes of the elementary operations of linear algebra, are the ansatz to most basic problems of thermodynamics. Another example of ansatz is to suppose the solutions of a homogeneous linear differential equation and difference equation to have, respectively, exponential and power form. More generally one can guess a particular solution of a system of equations and test such an ansatz by direct substitution of the solution in the system of equations.

Homogeneous linear differential equation에서의 예

$$ m\ddot{x} + kx = 0 $$

위 경우 general solution은 다음과 같다.

$$ x = C_1 sin \omega_0 t + C_2 cos \omega_0 t $$

여기서 $\omega_0^2 = \frac{k}{m}$ 이다.

참고

- 위키피디아