

Abstract

Amerongen, J. van, "*Dynamical Systems for Creative Technology*", Controllab Products B.V., Enschede, viii+239, ISBN 978-90-79499-07-6, 2010

Dynamical Systems for Creative Technology gives a concise description of the physical properties of electrical, mechanical and hydraulic systems. Emphasis is placed on modelling the dynamical properties of these systems. By using a system's approach it is shown that a limited number of mathematical formulas suffices to describe the basic properties of all of these systems. Mathematical functions such as integration and differentiation are introduced and directly related to real world phenomena, ranging from pure technical systems, to motions of flowers or social systems. More abstract descriptions help to systematically analyse these systems and support the modelling process.

The first chapters deal with describing basic systems in the hydraulic, electrical and mechanical domain. Mathematical and simulation tools are introduced and used to analyse such systems. Next, it is shown that all these systems share the same basic properties, which allows the use of analogon models. A more abstract domain-independent description helps to better understand the dynamic behaviour and allows for modifications of the system in the domain that is most easily accessible.

The last chapters deal with the role of feedback in dynamical systems. Examples are shown by applying these concepts to electronic simulation models with operational amplifiers. Feedback control systems are briefly introduced as a means to change the dynamical properties of a system.

In the text and exercises extensive use is made of the modelling and simulation programme 20-sim.

This programme supports all the models used in this book, especially icon-based physical models. The exercises stimulate exploration of the programme and experimenting with the models. The exercises are intended to raise questions rather than being classroom problems with a straightforward solution.