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Content

Using a Dirivative Filter for Filtering of the Second Order Signal from the Accelerometer and the Calculating of Derivative

A.Yu. Ivoilov, D.S. Fedorov, V.A. Zhmud, V.G. Trubin

Abstract

The problem of filtration and determination of the first derivative of the signals from the accelerometer ADXL335 is resolved.

Key words

Accelerometer, ADXL335, filtering, second-order derivative filter, microcontroller.

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Control of Object with a Single Output with the Usr of Two Input Channels of Influence

V.A. Zhmud, O.D. Yadrishnikov, V.M. Semibalamut

Abstract

Control of objects in the loop with negative feedback is widely used because it allows achieving of high accuracy in the presence of disturbances. As a rule, the number of channels for input actions in the object is equal to the number of output controlled variables. In some cases, the structure of the mathematical model of the object can control the output value in different ways, which correspond to different mathematical models. In each of these models there are their own limits on the maximum value of the speed of the output value and so on. Ioint control by the both channels can at once provide both high speed control and a large range of controlled changes in the output value of the object. This requires the use of two regulators jointly acting on the object. Issues of harmonization of dynamic and static properties of these controls were considered theoretically using transfer functions; however, the publications have not been considered such restrictions of one of the control channels of the object as a dynamic non-linearity. This paper discusses these limitations in one of the channels, using the mathematical modeling for getting the transients processes and to optimize the regulators. Features of using of this method are investigated by an example.

Key words

Control, feedback, automation, regulator, quality control, precision

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Increasing of the Accuracy of Object Controlling by Combining the Advantages of Several Sensors

V.A. Zhmud, O.D. Yadrishnikov, V.M. Semibalamut

Abstract

Precise control of objects in the loop with negative feedback or stabilization of their output values are widely used in science and technology. Stabilization accuracy or control depends not only on the properties of the controller, but primarily on the accuracy of the sensor of output value. Often the choice of the best sensor is impossible because the different sensors may have better properties in different frequency ranges, and none of the sensors is the best in all respects. For example, sensors, offering the best performance, often characterized by low accuracy and the most accurate sensors are often not fast enough. In this paper the method of combining the advantages of different sensors is recearched. The study is carried out with the simulation program VisSim.

Key words

Control, feedback, automation, regulator, quality control, precision

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Modification of the Adaptive System for More Effective Noise Suppression

A.N. Zavorin

Abstract

Adaptive control is widely used to control objects, changeing their parameters during its operation. One way of constructing such systems consists in using test deviations that are introduced into the signal, or in any coefficient of the regulator [1]. Decisive device in this system analyzes the quality of the system on the basis of the criterion given beforehand, and changes the regulator to achieve the best quality of the control (according to these criteria). The disadvantage of this system is the presence of transient processes, even if the quality of the system corresponds to the requirements set for it. The paper discusses a method for eliminating of this drawback.

Key words

Automation, control, simulation, automatic control theory, numerical optimization, stainability, quality of the transition process, adaptive systems, self-adjusting system.

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Energy distribution of scattered on graphene carbon atoms depending on their grazing incidence angle

A.M. RASULOV, A.A. DZHURAKHALOV, I.D. YADGAROV, D.V. ALYABYEV, V.G. STELMAKH

Abstract

Scattering processes of carbon atoms on graphene at grazing incidence have been investigated by computer simulation and the energy distribution of scattered atoms were obtained.

Key words

Computer simulations, graphene, scattering, Brenner potentia

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Optoelectronic System for Distant Control of Explosive Hydrocarbon Concentration in Atmpophere

Nematzhon Rakhimov, Sultonaly Abdurakhmanov, Tukhtasin Butaev

Abstract

In work, questions of creation of the remote gauge of detection explosive concentration of hydrocarbons in atmosphere are considered. The new system of reception - data transmission on distances Is offered, applying modern processor modules of input-output of electric signals.

Key words

Optoelectronic system, infrared radiation, hydrocarbon, absorption spectrum

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About Trancated Model of Controled Object

A.N. Zavorin, V.A. Zhmud

Abstract:

This paper considers the problem of incomplete identification, which should be solved by using the method of numerical optimization controllers for real objects. The problem is that there is always such a high-most portion of the model which is not determined as the result of identification. Usually, it is considered such that corresponds to the simplest model, i.e., for example, it is believed that the high-frequency region does not have any kinks logarithmic amplitude-frequency characteristics and the additional phase shift increments. Although this hypothesis and provides the most simple record of the object model, it is not true. Therefore, measures are needed to achieve compliance with the result of the optimization of its practical application. The article proposes an effective method of solution of this problem.

Key words:

Automatic control, controller, single-channel system, the truncated identification, astatic system, minimum-phase units, frequency method, the analytical method.

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The Use of Platform STM32VLDISCOVERY for Making of Simple Data Acquisition System

A.V. Eskin, A.L. Pechnikov, V.G. Trubin

Abstract
In order to apply an effective control algorithm of the automatic control system, it is important to study the properties of the control object to design the whole system. This problem is usually solved by data acquisition system (DAS), which are often implemented on circuit boards in the body of a personal computer or as a separate device. The cost of these boards is rather high and sometimes use of them is unnecessarily for control of simple objects. The paper proposes a solution of this problem with takes less time and less material resources. This is true for systems with a small number of controlled values (not more then 12), and with a slow variation of the useful signal (1 kHz). This decision will be useful at the stage of prototyping devices with digital control, where it is required the possibility of sensor readings from time to time in text format for further processing (for egxample, for curves plotting in Excel).
Key words
Data acquisition system, ADC, computer, measurement, microcontroller, microprocessor.

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The Difference between Basic Metrology and Classical One

Vadim Zhmud

Abstract

The paper gives the main determinations of basic metrology and its difference from the classical one. The paper is addressed to abiturients and students of the forst coutses.

Key words

Basic metrology, classical metrology, measurements, accuracy, error, precision measurements

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Connection of the Thomas-Fermi and Riccati

V.A. Zhmud

Abstract

Thomas-Fermi equation [1] is designed to describe the electronic structure of many-body systems. Writer Leonardo Sciascia has [2] describes a striking case with one of the young scientists in the field of theoretical physicists, Ettore Majorana, a disciple Enrico Fermi. This yang scientist, who died early, allegedly transformed Eq uation of Thomas-Fermi into Riccati equation to calculate the required coefficients of the table. The article discusses the likely source of kinship of these equations.

Key words

Physics, the theory of automation, feedback, enerogetic levels, the Thomas-Fermi equation, Riccati equation, Marjorana, Fermi.

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About the Nature of Relativistic Concept of Correction to Data of Global Systems GPS and GLONASS: Conception from the Point of View of Locked Systems Theory (Automatics)

V.A. Zhmud

Abstract

This paper progongs discussion about the use of relativistic corrections to data processed by the global spase systems GPS and GLONASS [1]. Many separated facts indicate the mistakenness of the relativistic theory. The combination of these facts together surely proves the absolute mistake of relativistic approach to this problem. The paper discusses with the Special Theory of Relativism on the base of modern experimental knowledge and mathematic theories.

Key words

 GLONASS, GPS, relativism, red shift, atom, automatics.

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