

Summaries

Jerzy Baranowski: **State Estimation in Linear Multi-Output Systems – Design Example and Discussion of Optimality** • Automatyka 2006, t. 10, z. 2

Problem of full rank observer design for multi output systems is considered. Joining of pole placement and optimization of chosen performance index are proposed. Two performance indexes (16) and (25) are presented along with reasoning for their application. Results are illustrated on the example of RC ladder network along with simulational results.

Keywords: Luenberger observer, parametric optimization, RC ladder network

Marcin Ciecholewski, Krzysztof Dębski: **Automatic Detection of Liver Contour in CT Images** • Automatyka 2006, t. 10, z. 2

Computed Tomography (CT) has been widely used for liver disease diagnosis. CT scans can bring precise inspection and shape extraction during examination. Computer-assisted methods to help extract organs and classify diseases from medical scans has received considerable interests over the past years. As a first step of gathering necessary data we need to isolate or segment the liver boundary within CT liver image. In the paper a fully automated method to detect a liver contour has been presented. We propose an author's algorithm based on piece-wise linear interpolation which extracts liver boundary. The paper provides necessary background of radiological anatomy and imaging of the liver.

Keywords: computer-tomography, liver boundary, liver contour, linear interpolation, polyline

Marcin Ciecholewski, Krzysztof Dębski: **Segmentation Method of the Liver in CT Images Using Approximate Contour Model** • Automatyka 2006, t. 10, z. 2

The segmentation of the liver structure from a computed tomography (CT) image is an important function of the software designed to assist liver diagnostics, because it allows for the elimination of excess information from the diagnostic process. This paper presents an original method of the automatic segmentation of the liver structure of both healthy organs and those with such specific disorders as hemangiomas and hepatomas. In this paper, the task of segmentation has been implemented through first finding the contour of the liver which is made up of a finite number of joint polylines approximating individual fragments of the liver in the CT image. The initial reference point for the calculations is the lumbar

section of the spine which is a central point of any CT image of the liver. Next, the field outside the contour is divided into two polygons and eliminated from the image.

Keywords: liver contour, polyline, image segmentation, computed-tomography

Henryk Górecki: **The Resultants and Discriminants of Real Polynomials and Quasipolynomials** • Automatyka 2006, t. 10, z. 2

The paper presents the connections between resultants of the algebraic and transcendental polynomials. The resultants give information about the problems of stability and the maximal errors in linear stationary dynamic systems.

Keywords: analytical results for the errors in linear dynamic systems stability criteria, Vandermonde determinant, discriminants of the polynomials and quasipolynomials Sylvester determinant

Krzysztof Oprzędkiewicz: **An Implementation of the Smith's Predictor at the PC Based Soft PLC Platform** • Automatyka 2006, t. 10, z. 2

In the paper problems of practical implementation a special control algorithm "Smith's predictor" were presented. The control system was implemented onto PC – based "soft PLC" platform. A basis version of "soft PLC" system (without real-time kernel) was used. In the paper the hardware and software platform to the task realization were shown, results of experimental tests of real-time requirement during considered control algorithm are also presented. The main conclusion from the paper is that the tested "soft PLC" system implemented with basic version of software assures keeping the longest cycle time of a controller fully responsible for a wide class of industrial control tasks.

Keywords: PLC control system, PC based control, Smith's predictor, time-delay systems

Marcin Piątek: **Real Time Application Interface Focused on Servo Motor Control** • Automatyka 2006, t. 10, z. 2

The work describes how to use modified GNU/Linux, Real Time Application Interface operating system. It provides mechanisms for developing hard real time task and related features. System architecture and some main features are discussed. Two main parameters: latency and jitter are collected. Additionally the jitter is measured and compared with RTAI and Matlab/Simulink® Real

Time Windows Target. Some basic tests are performed e.g. a square wave and a sine wave were generated and results are shown. The main goal of the paper is to develop a servo motor control system. The Linear Quadratic based algorithm is used as a two layer algorithm. The proportional controller is calculated in the first layer. Parameters of this algorithm are obtained in the second layer. It benefits from the special, multilayer system structure. In comparison the same algorithm is developed with Matlab/Simulink® and its Real Time Windows Target extension. The results are measured and shown in a graphical form.

Keywords: *RTAI, servo motor, hard real time operating system, GNU/Linux*

Aleksander Simicz: **Analysis of Possibilities of Distributed Control Using GPRS Technology** • *Automatyka* 2006, t. 10, z. 2

This paper presents analysis of transmission delays in GPRS telemetry system. The system is based on MT-101 module. This is industrial controller with SIM card, so it can work in GSM/GPRS cellular phone network. Data are received from the module by GPRS modem which is connected to a main PC computer. Data are transmitted through GPRS network having a form of frames of industrial Modbus protocol. On the main PC an OPC Server is running, making the MT-101's resources accessible. With a wrapper DLL library it was possible to process and visualize data using an application in MATLAB. The main purpose of the research was to compare delays for modes of transmission. The first one was based on sending test packet directly after information about receiving previous packet. On the second case frames were sent with constant time interval, consequently making transmission delays. The research has shown that the first approach is much better. It is clearly visible on delay histograms. It is possible to develop a distributed control system based on GPRS technology. Dynamical objects controlled in such a way must be asymptotically stable.

Keywords: *automation, distributed control, GPRS, MATLAB, MT-101, transmission delays*