



CONTROL SCIENCES

**Научно-технический
журнал**

6 номеров в год
ISSN 1819-3161

УЧРЕДИТЕЛЬ

Учреждение Российской
академии наук

Институт проблем управления
им. В.А. Трапезникова РАН

Главный редактор

Д.А. Новиков

**Заместители главного
редактора**

Л.П. Боровских, Ф.Ф. Пашенко

Редактор

Т.А. Гладкова

Выпускающий редактор

Л.В. Петракова

Издатель

ООО «СенСиДат-Контрол»

Адрес редакции
117997, ГСП-7, Москва,
ул. Профсоюзная, д. 65, к. 410.
Тел./факс (495) 334-92-00

E-mail: pu@ipu.ru

Интернет: <http://pu.mtas.ru>

Оригинал-макет
и электронная версия
подготовлены
ООО «Авансед Солюшнз»

Отпечатано в ИПУ РАН

Заказ № 80

Подписано в печать
8.06.2010 г.

Журнал зарегистрирован
в Министерстве Российской
Федерации по делам печати,
телерадиовещания и средств
массовых коммуникаций
Свидетельство о регистрации
ПИ №77-11963 от 06 марта 2002 г.

Журнал входит в Перечень ведущих
рецензируемых журналов и изданий,
в которых должны быть опубликованы
основные научные результаты
диссертаций на соискание ученой
степени доктора и кандидата наук

Подписные индексы:
80508 и **81708** в каталоге Роспечати
38006 в объединенном каталоге
«Пресса России»

Цена свободная

© Учреждение Российской
академии наук
Институт проблем управления
им. В.А. Трапезникова РАН

ПРОБЛЕМЫ УПРАВЛЕНИЯ

3.2010

СОДЕРЖАНИЕ

Обзоры

Кулинич А.А. Компьютерные системы моделирования когнитивных карт:
подходы и методы. 2

Математические проблемы управления

Зак Ю.А. Решение обобщенной задачи Джонсона с ограничениями
на сроки выполнения отдельных заданий и времена работы машин.
Ч. 1. Точные методы решения. 17

Анализ и синтез систем управления

Гуляев С.В., Шубладзе А.М., Кузнецов С.И. и др. Нелинейные помехо-
защищенные дифференциаторы 26

Управление в социально-экономических системах

Коломеец А.А., Ключков В.В. Информационные системы как средство
обеспечения адаптивности фирмы в нестабильной среде. 30
Горошеникова Т.А., Цвиркун А.Д. Методы и инструментальные средства
оптимизации развития холдинговой компании 38
Масаев С.Н., Доррер М.Г. Оценка системы управления компанией
на основе метода адаптационной корреляции к внешней среде. 45

Управление сложными технологическими процессами и производствами

Резчиков А.Ф., Твердохлебов В.А. Причинно-следственные комплексы
взаимодействий в производственных процессах 51
Ершова О.В. Компьютерные тренажерные комплексы для повышения
эффективности управления процессами электротермического производства 60

Информационные технологии в управлении

Павлов П.А. Организация однородных конкурирующих процессов
при распределенной конвейерной обработке. 66

Управление подвижными объектами

Шубин А.Б., Александров Е.Г., Харченков Г.Г. Близкое к оптимальному
управление траекторией движения объекта 73

Хроника

Современные методы навигации и управления движением: модели и методы
обработки информации в задачах управления движением 79

* * *

Contents and abstracts. 83

* * *

Василий Николаевич Новосельцев (к 75-летию со дня рождения) 84



CONTENTS & ABSTRACTS

COGNITIVE MAPS MODELLING COMPUTER SYSTEMS (APPROACHES AND METHODS) 2

Kulinich A.A.

Computer systems of decision-making support in ill-structured dynamic situations, based on modeling of the expert knowledge presented by cognitive maps are considered. Methods and approaches of the basic functional subsystems realization of decision-making support systems of this class are analysed.

Keywords: cognitive map, «soft» system analysis, modeling system architecture, parameterization, verification, correction.

SOLUTION OF THE GENERALIZED JOHNSON PROBLEM WITH CONSTRAINTS ON THE SCHEDULE AND TIME OF THE MACHINE. PART 1. EXACT SOLUTION METHODS. 17

Zak J.A.

The problem of finding an optimal permutation which determines the sequence of a set of tasks in a fixed and equal for all tasks sequence of execution of certain works on different machines, is generalized to the case when the restrictions on the start and end time both for execution of individual tasks, and the time of equipment work are set. The properties of admissible and optimal sequence of tasks are studied. The formulas for calculating the lower limit of the total length of the schedule are presented. Exact and approximate methods for solving the problem are developed.

Keywords: flow-shop problem, optimal schedule, the sequence of assignments, restrictions on the start and end time.

NONLINEAR NOISE IMMUNITY DIFFERENTIATORS 26

**Gulyaev S.V., Shublazde A.M., Kyznetsov S.I., Krotov A.V.,
Olshvang V.R., Malakhov V.A.**

The paper proposes the method for solution of a differentiation problem, allowing to receive an estimation derivative Gaussian stationary signals close to optimum by standard deviation criterion if spectral density useful signals and noise are known to within level. Realization of this method with the use of nonlinear dynamic systems organized in a special way is considered. The comparative estimation of quality indicators of results of differentiation nonlinear differentiator, linear and relay differentiators is presented.

Keywords: differentiation, adaptation, optimality, Gaussian noise.

AN ENTERPRISE INFORMATION SYSTEM AS A MEANS TO PROVIDE AN ADAPTIVITY OF A FIRM IN AN UNSTABLE ENVIRONMENT 30

Kolomoets A.A., Klovchov V.V.

The paper presents the economical and mathematical model of a company with an enterprise information system (EIS) in the control loop. Indicators of EIS quality and efficiency are suggested. The task of EIS parameters optimization based on the company profit maximization is considered. The approaches developed are shown by an example of air ticket sold registration system.

Keywords: enterprise information system, economical efficiency, simulation, limited rationality, control loop, adaptivity.

METHODS AND TOOLS FOR OPTIMIZATION OF HOLDING COMPANY DEVELOPMENT 38

Goroshnikova T.A., Tsvirkun A.D.

Problems of control of a holding company development and methods of optimization of its development with use of a complex of interconnected models of various type (optimization, simulation, optimization-simulation) are considered. The developed tools for optimization of a holding company development are presented and illustrated by an example.

Keywords: development control, holding company, investment analysis, investment projects, complex estimation, optimization-simulation approach.

COMPANY MANAGEMENT SYSTEM ESTIMATION ON THE BASIS OF ADAPTIVE CORRELATION TO THE ENVIRONMENT 45

Masaev S.N., Dorrev M.G.

The method of express audit of the structure and indicators of a company business processes based on the calculation of simple correlation between historic series of expenses is proposed.

Keywords: correlation, adaptation, process, system analysis, management.

CAUSAL COMPLEXES OF INTERACTIONS IN PRODUCTION PROCESSES 51

Reztchikov A.F., Tverdokhlebov V.A.

For the description of interrelations and interactions of the homogeneous processes, forming production processes, the discrete determined models in the form of causal complexes are proposed. The paper develops fundamentals of construction of the complexes, new structures of sections and rules of a composition of sections and complexes. The formal language for representation of a structure and a complex as a whole is proposed. It is noted, that the developed means allow to represent complexes by hierarchical structure with consecutive transition from the rough and approximate description of production process to its representation by model with the set depth, completeness and accuracy.

Keywords: cause, consequence, causal relationship realization conditions, group of cause, group of consequence, complex of causal relationship, discrete process, interaction of processes.

INCREASE OF CONTROL EFFICIENCY OF ELECTROTHERMAL PROCESSES USING THE COMPUTER TRAINING COMPLEXES. 60

Ershova O.V.

Issues of development of computer training complexes for personal learning and increase of control efficiency of electrothermal process on the example of calcium carbide manufacture are considered. The structure of complexes is proposed, the functional components are characterized for acquisition of effective control skills and the knowledge check.

Keywords: computer training complexes, trainee instructor, increase of control efficiency by electrothermal process.

THE ORGANIZATION OF HOMOGENEOUS COMPETING PROCESSES AT THE DISTRIBUTED CONVEYOR PROCESSING 66

Pavlov P.A.

Formulas and estimations of minimum general time of performance of the homogeneous distributed competing processes are received. The comparative analysis of modes of interaction of processes, processors and blocks of the structured program resource taking into account additional system expenses is carried out.

Keywords: distributed process, program resource, homogeneous system, asynchronous mode, synchronous mode, structurization, parallelism.

NEAR OPTIMAL MANAGEMENT TRAJECTORY OF OBJECT MOVEMENT 73

Shubin A.B., Alexandrov E.G., Harchenkov G.G.

The problem of calculation of the control transferring the ship from one point of water space in a final point with set phase coordinates and speed is considered with the use of model of the ship described by the system of differential equations of the fifth order. The paper shows that this requires only five reruns of the wheel, calculated by means of algorithm of programmed control. Results of modeling of trajectories on PC, including movement on the winding narrow channel and movement with variable speed are presented.

Keywords: optimum control of mobile object, ship model, differential nonlinear equation, management calculation, trajectory modeling, movement in the narrow channel.

MODERN METHODS OF NAVIGATION AND MOVEMENT CONTROL: MODELS AND METHODS OF INFORMATION PROCESSING IN THE TASKS OF MOVEMENT CONTROL. 79

VASILY NIKOLAEVICH NOVOSELTSEV

(on the occasion of 75th anniversary) 84