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Review of monografies:
"DYNAMICS OF DISTRIBUTED PARAMETER SYSTEMS: ANALYSIS AND SYNTHESIS IN PARAMETER PLANE ", "STEAM GENERATOR DYNAMICS", "HEAT EXCHANGER DYNAMICS"

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More then fifty years scientists from all over the world are interest to processes with distributed parameters presented in their typical represent recuperative heat exchangers which are objects of automatic control. Their priority interest were in mathematical modelling of this processes, researching their dynamics through conventional and unconventional criteriumes of stability, like as usage of many important **concepts** of **control engineering** in **conventional** and modern theory of systems.

In mathematical meaning this complex objects of control are presented **by** partial differential equations although it is reasonable to use a solutions which are based on description of processes with common differential equations which clearly means that presupposition of field homogeneity of relative physical values are imported. Their mathematical models in forms of partial differential equations generate a lot of additional difficulties in their mathematical treatment and only in few cases gives as analytical solutions in **closed** form. In the other way, like as systems of infinite dimension their researching in complex, **frequency** domain are reservation with presence of transcendent **members** which practically, in any way, caused serious numerical problems that we cannot use results from classical theory of common systems (with **lumped** parameters) of automatic control.

Authors of this monographs were noticeable the importance of this class of objects and processes for modern theory and more for practices and decided to write three particular, independent monographs for this complex domain of researching.

In the introduction common for all of three monograph authors treats basic and global problems of mathematical modelling of objects and processes of modern systems of control **engineering.** In this sense especially problems of **control volumes and selection process models** are treated out, which practically give as a basic postulates for usage of elementary law of conservation, often gives in form of rebalance of mass, energy and impulse, written for **non stationary** states of processes. Because of complete cognition about modern problems of modelling it is discuse too about importance and category of models.

The second whole of monographs are about classification of **control systems, objects and processes** and gives **basic theory** and particular mathematical foundation which have to help in later dynamical analysis of behaviour mentioned classes of objects. In that sense **a** detailed analysis of finite and infinite dimension **systems,** which practically cover all of essential questions about processes with **pure time lag** described with common differential equations with **shifted** argument and processes with distributed parameters described with partial differential equations **were discussed**.

In first monograph brunt of modelling were turned to well known thermal processes with standard configuration and with one part to original consideration of dynamic of extraction of glass capillaries where is given a solution of problem of stationary and non-stationary temperature field inside of industry fry for that destinations like as dynamical behaviour of carrier of shape this capillaries. Odd part of monograph is dedicated to problems of drain of zealot dust with dynamics of simultaneous transfer of heat and mass. In the two last mentioned cases, unique diagrams of simulate results are undoubted approve very high available value of obtain mathematical models and their engineering and technical compatibility with really behaviour of mentioned systems, objects and processes.

Seventh, eighth, ninth and tenth chapters present a skeleton of this monograph about steam generators. Altogether it is presented eight different models of steam coppers with specific construction and for it of them it is presented results of their simulation, like as correlate with experimentally collect references.

In the last chapter of this monograph, authors are presented several original results, which relate on promotion and development of mathematical models of mill plant. In that sense, it is presented results which

in mathematical model of mill plant include also dynamics of rotors and dynamics of processes of coal drying. It is also presented adequate structure and block diagrams which enable efficiency review of essence of a problem.

Central part of monograph of heat exchangers consists basic scientific and professional contributions. It is presented altogether twenty different mathematical models of heat exchangers with specific constructions and for same of them it is presented results of their simulation, like as correlate with experimentally collect references.

Presented mathematical models are give in the forms of systems of common non-linear and linear **ordinary** or partial differential equations and give as good foundation for development and usage for form of equivalent models in **state space**.

Special view of problematic of modelling of heat exchanger is presented in tenth and eleventh chapter of monograph.

Seeing that very much of mathematical models of heat exchangers are in form of systems of linear partial differential equations it is suggestion, instead of classical approach in position of mathematical discretization of **basic** systems of equations, so called procedure of physical "discretization of processes" with this write of basics balance equations are done for each single "cells", so in finite model we don't have partial differential equation yet common equation in form of systems of common differential equations with high order which for computers isn't a problem to solve. By specifically definition of matrix it is easy to pick boundary conditions which is correlate with first and last cells of discretization mathematical model. Successful of proposed approach is illustrated by adequate simulation diagrams and results of experimental investigations. **An** example of one pipe heat exchanger **was used to illustrate a particular** approach for this problems known by name: " transport approach", which very efficiently systems of differential equations **convert** in **the system of algebraic equations.**

Special scientific contribution of authors is also that in monograph about processes with distributed parameters they are presented known results of other authors about application of parameter method for analysis and synthesis of systems with distributed parameters and also presented their original results. On this way, without structures catch, it is enable to picture optimal contours from basic plain in plain of reclamation parameters and all of that enable to pick adequate model of control, which gives high level of quality in work of whole system using their demanding degree of relative stability. In that sense, it is presented and originally solved problems of using of D – partioning method, extraction of region of **a priori** propose **settling time** and degree of **damping ratio** first by usage Mitrovic method then modify Mitrovic method and at last with universal algebraic method. In all of considerable cases it is taken in respect linear relation of adjustable parameters in coefficient of kvazipolinomial system except in the last case when it was permit also relation of non-linear type in form of derivation which presented a full generalisation of problems.

In the last comments, in all monographs, it is given a short recapitulations of basic results like as critical attention on requisites for written this monographs, with respect on actuality of heat exchangers like as considerable objects of automatic control and definite deficiency of literature in this area in our country.

All of monographs consist also detailed chronological summary of **published** results on field of mathematical modelling of objects and processes under consideration. In the numbers of **appendixes** needful theoretical comments and mathematical proves of second order **were given**. Also, a lot of constructive and work characteristics of different types of heat exchangers and steam coppers, like as other considerable processes, **were attached at the same place.**

On the base of detailed review of monographs and books material which is compatibility rabbet, it is especially pleasure to recommend this edition to reader like as needful text to known existent and modern performance in mathematical modelling and in simulation of work of modern heat exchangers whether that they are in process industry or in **steam generating** plants.

Reviewers of **monographs** were: Dr Svetislav Zaric, prof., Dr Dimitrije Voronjec, prof., Dr Velimir Simonovic, prof. and Dr Branislav Jacimovic, prof.

The monografies with hronological order were:

"**Dynamics of Distributed Parameter Systems: Analysis and Synthesis in Parameter Plane** ",
D.Lj. Debeljkovic et. al, GIP Kultura, Belgrade, 2000,(in Serbian), pp. 271.

"Steam Generator Dynamics",
D. Lj. Debeljkovic, V. S. Mulic, Cigoja press, Belgrade, 2001, (in Serbian), pp. 351 .

"**Heat Exchanger Dynamics",**
D. Lj. Debeljkovic, V. S. Mulic, G. Simeunovic, Cigoja press, Belgrade, 2002, (in Serbian), pp. 268 .

Katica (Stevanović) Hedrih and Julijana Simonović