



UNIVERSITY OF NIŠ

The scientific journal **FACTA UNIVERSITATIS**

Series: **Mechanics, Automatic Control and Robotics** Vol.2, No 8, 1998 pp. 819 - 820

Editor of series: *Katica (Stevanovič) Hedrih*, e-mail: *katica@masfak.masfak.ni.ac.yu*

Address: Univerzitetski trg 2, 18000 Niš, YU, Tel: (018) 547-095, Fax: (018)-547-950

<http://ni.ac.yu/Facta>

300 YEARS OF OPTIMIZATION SANU, December 17, 1997

In the organization of Department for Mechanics Mathematical Institute and Department of Technical sciences of Serbian Academy of sciences and arts, the scientific symposium "*Three hundred years of optimization*" was organized on december 17, 1997 in Belgrade. The organization Board of the Symposium were academician SASA Petar Miljanić, secretary of Department of Technical Sciences SASA, academician Academy of nonlinear sciences Veljko Vujičić, head of Department of Mechanics Mathematical Institute of SASA, prof. dr Radivoj Petrović, Traffic Faculty Belgrade and academician SASA Miomir Vukobratović.

We can take the year 1697 as the year when the sciences of Optimizations were established. In the same year J. Bernoulli has assigned mathematical-geometric problem in the form of a call for solution. Problem consisted of search for a line between A and B points through which heavy point moves in the field of gravitation and arrives in the shortest time from one point to other.

Six solutions for the problem arrived, given by: Lajbnić, L'Hopital, Isac Newton, brothers Bernoulli, i Tschrihaus. They were the most famous names of the epoch. The problem of brahistohrone was hereby set. This had been recorded by the Journal Acta Euditorium from Groningen 1697.

In the period from 1700 to 1900 the famous names of optimization were:

Johan Bernoulli, L. Euler, J. Lagrange, Ostrogradski, Hamilton, Jacobi, Legandre, Weierstrass.

In this century, an important foundation of the optimization theory was given by Lev. Simonović Pontrjagin 1956. with his Principle maximum and Richard Bellman 1957 with his Principle optimality.

In Yugoslavia first research project on optimization, by initiation of mathematician, 1961-63 was in the organization of the three Institutes for nuclear sciences from Belgrade, Zagreb and Ljubljana.

The program of this Symposium, dedicated to three hundred years of foundation of Optimization, included the following hystorical and reserch 30-minutes lectures:

Petrović R.: *300 years of Optimization Theory - Retrospectives.*

Dajović S.: *Intersection Principles in Calculus of Variations and Optimal Control Theory.*

Kovačević-Vujičić V. *Stabilization of internal Methods for Linear Optimization.*

Maksimović S.: *Calculation of Big Structural Systems on the basis FTE and Criteries of Optimization.*

Cvetković D.: *Combinatorial Optimization and the Graph isomorphism problem.*

Oprićević S.: *Multycriterial Optimization and Compromise Solution.*

Bilen B.: *Optimal Control of Ships on the initial Shipsway.*

Vujičić V.: *About Action Principle and Optimal Control of the Mechanical System Motions.*

Vujanović B.: *About Kanonical Bilinear Forms of Variational Principles in Heat Conduction.*

Bačlić B.: *Optimal Linearization of Nonlinear Diffuzion Problems.*

Spasić D.: *About Lagrange's Problem: Optimal Forms of Coulmn.*

Atanacković T.: *About some Variational Principle and Applications.*

Stojić M.: *Principle of Optimization and Appliations in Sciences and Enginnering.*

Vuković J. i Obradović A.: *Optimization of System Bodies Motion under the limitations with internal Reactions.*

Vukobratović M.: *About Researh Problems of Operational Criteries of Activ Systems Optimalization.*

Miljanić P.: *Review on the Simposium Contributions.*

V. Vujičić, in a short lecture, established the Principle of action in the new form using total work of active forces and of inertia force.

"V. Vujičić, in his short lecture presented the action principle in thr form

$$\delta \int_{t_0}^{t_1} [A(Q) - A(J)] dt = 0$$

where $A(Q)$ is the work of all active forces, and $A(J)$ the work of inertia force

For determining the functional extremum:

$$\int_{t_0}^{t_1} F(p, q, u, t) dt \rightarrow \begin{matrix} \min \\ \max \end{matrix}$$

during mechanical systems' motion, he suggested, thereby, the general condition:

$$\delta \int_{t_0}^{t_1} [\delta A(Q) - \delta A(J) - \gamma F] dt \geq 0 "$$

In the closing lecture, academician Petar Miljanić gave positive evaluation of the results of participants.

The Symposium pointed out the importance of optimization both in applying to different areas of science, enginnering technology, and to different areas of working and living spheres of human activity. It also pointed out the importance of optimization elements in education and proffesional study of young generation.

K. S. H.