

THE LIFE AND WORK OF PROF. VLATKO BRČIĆ, PH. D.

1. WORKING BIOGRAPHY

Professor Brčić was born on 16th September 1919 in Varazdin, where he completed his primary school and grammar school. He finished his grammar school in June 1938 and enrolled at the Faculty of Philosophy, Zagreb University, at the Department for Theoretical Mathematics and Physics.

Professor Brčić graduated on 30th June 1942, and the same year enrolled at the Civil Engineering Department of the Technical Faculty in Zagreb, where he stayed one school year. By the end of November 1945 he enrolled the Faculty of Civil Engineering of the High Technical School in Prague, Traffic Engineering Department as their scholarship holder. He graduated in June 1947 and thus acquired the academic titles of the graduate mathematician and graduate civil engineer.

After the completion of his studies, professor Brčić was employed as a structural engineer and designer in the Design Bureau of the Ministry of Buildings in Zagreb. By March 1948 he was transferred to the building area in New Belgrade where he worked as a chief of construction site, as a structural designer and as a manager of the expert courses from different areas of the practical civil engineering and during three years he was a teacher on the Workers' Technicum which was founded there.

By September 1951 professor Brčić was employed as a teaching assistant at the Faculty of Civil Engineering in Belgrade for the subjects of Mechanics and later for Strength of Materials. In October 1956 he defended his doctoral dissertation titled "Contribution to the solution of Plane problem in the Elasticity Theory".

In 1957, professor Brčić was elected assistant professor for the subject Numerical Methods for the students of the first year of the Geodesy Department. He lectured the subject of Numerical Methods, Mechanics and Strength of Materials. In 1962 he was elected an associate professor for the subject of Strength of Materials, and in 1966 the full professor for the same subject. He remained there till his regular retirement in 1984. Between 1967 and 1969 he was the dean of the Faculty of Civil Engineering in Belgrade.

2. TEACHING ACTIVITIES

2.1. Teaching at the undergraduate studies

During his teaching activities, professor Brčić taught Numerical Methods, for which he published a text book (three reprints). He formed very modern concept of this subject, introducing a rational-mathematical approach in solving the practical technical problems.

From 1960 to 1967 a so called multi-stage teaching existed at the University. In this form of teaching process, professor Brčić lectured Mechanics 1 and Strength of Materials at the first teaching stage at the newly founded Faculty of Civil Engineering in Nis, and he taught Mechanics 2 (Dynamics) and Strength of Materials with the Elasticity theory at the second stage of teaching process at the Faculty of Civil Engineering in Belgrade. The multi-stage teaching was abolished in 1967 and the continual system of teaching was reestablished. Professor Brčić then lectured Strength of Materials at the second year of studies. Because of the retirement of certain teachers, he taught Mechanics and Structure Testing for a while.

At the same time, professor Brčić taught Strength of Materials at the Civil Engineering Department at the Faculty of Technical Sciences in Novi Sad (1971-72), at the Faculty of Civil Engineering in Subotica (1974-1993) and the Faculty of Civil Engineering in Podgorica (1989-1994), while he taught the Elasticity theory with Strength of Materials at the Faculty of Mathematics and Natural Sciences in Belgrade. From 1989 he taught Dynamics and Construction stability at the Faculty of civil Engineering in Podgorica.

2.2 Teaching at the post-graduate studies

Professor Brčić taught the first course for the post-graduate students at the Faculty of Mathematics and Natural Sciences in Belgrade. It was Plane Problem in the Elasticity Theory by application of the theory of complex functions. In 1961 he taught Theory of Elastic and Plastic body, at the Electrotechnical Faculty in Belgrade. The course was initiated by the "Boris Kidric" institute in Vinca, for the mechanical, electrotechnical and technological engineers.

In 1964 the post-graduate studies were initiated at the Faculty of Civil Engineering in Belgrade, so Professor Brčić taught Structure Dynamics. It was the first time in the country that the structure Dynamics appeared in the curriculum of the faculty. The disastrous earthquake which ruined Skopje in 1963, intensified the need for the comprehensive research work on the problems pertaining to the influence of the seismic forces on structures. Professor Brčić wrote scripts and a textbook for Structure Dynamics (the first of a kind in Yugoslavia, two reprints).

Professor Brčić taught Structure Dynamics courses at the faculties of civil engineering in Nis and Novi Sad. As the need arose that the practical civil engineers should be additionally educated in the area of Structure Dynamics, Professor Brčić organised, in cooperation with the Faculty of Civil Engineering in Belgrade and the Union of engineers and technicians, the short courses in this discipline. His work at the improvement of the technical regulations in the field of seismic building, where all of the civil engineering research organisations from the whole former Yugoslavia participated, should be mentioned, too.

Structure Dynamics was introduced into the undergraduate programmes at the civil engineering faculties in 1968, so the Structure Dynamics course at the post-graduate studies was reduced to certain chosen chapters, which got modernised in time. Those were the seismic influences, including the non-linear dynamic analysis and the stochastic character of the seismic incitations, then the effect of the wind on the structures, the effect of the impact and explosive load, dynamics of machine foundations, non-linear problems and so on.

Professor Brčić taught the course of Material Rheology and the theory of Plasticity at the Faculty of Civil Engineering in Zagreb on alternate years from 1971 to 1991. He also taught Introduction to the Continuum Mechanics for the students of the Geotechnical Section at the Mining-Geological Faculty in Belgrade from 1970 to 1978.

3. SCIENTIFIC RESEARCHES

Immediately after his coming to the university in 1951, professor Brčić dealt with researches in the field of Structure Stability (stability of slabs reinforced with stiffeners), then in the field of the Elasticity theory including application of the complex functions and conformal representation in solving the plane problem in the elasticity theory.

In his doctoral dissertation, professor Brčić solves the problem of the determination of stress and deformation states with slabs loaded in its plane, with special accent on the problem of stress concentration. The problem was treated in three aspects: analytically – through the application of Muskhelishvili's methodology, then numerically – by the differential procedure and through relaxation method, as well as experimentally – through the application of the photoelasticity method.

Professor Brčić was an external associate at the "Jaroslav Cerni" Water Resources Institute at the model testing of the high dams through the plane and space photoelasticity methods. He dealt with the following non-linear problems (photoviscoelasticity, photothermoelasticity, testing of discontinual and anisotropic environments and with the application of holography in photoelasticity.

In 1958 professor Brčić sojourned in Munich and Zurich for two months, where he acquainted with the work of the laboratories for experimental stress analysis.

In 1963, professor Brčić spent 10 months in the USA as a scholarship holder of a technical aid, where he worked in improving the Moire method (with F. Zandman from the USA and S. Holister from the UK), then he dealt with the modern structure dynamics, and specially with the analysis of the seismic influences on structures. He participated at the summer course for the university teachers, in the field of the experimental stress and deformation analysis.

Upon the invitation of the American Science Association, he spent 12 months (1966-1967) as a visiting full professor at the Wayne State University, Detroit, Michigan. He lectured at the post-graduate courses in Structure Dynamics and participated in the research project in application of holography in photoelasticity, as well as in some current researches in the field of Biomechanics. He worked at the holographic researches with a team of associates at the Physics Institute of the Ann Arbor University, which was a pioneer work in this field in the world. He wrote and published scripts from the Structure Dynamics for the students of the post-graduate studies.

From 1969 till 1974 professor Brčić lectured the courses at the International Centre for the Mechanical Sciences in Udine, Italy. The courses comprised areas of the modern experimental methods (holography, non-linear problems, especially photoplasticity, photoviscoelasticity, photothermoelasticity). All the lectures were published in the "CISM" centre as well by the Springer publishing house, (Vienna, Berlin).

Professor Brčić worked to solve various problems pertaining to the testing of the dynamic behaviour of the machine foundations with the group of associates at the Faculty of Civil Engineering in Subotica.

His research work in Structure Dynamics was especially intense in the analysis of the structure vibrations under the effect of the stochastic incitation due to earthquakes or winds, as well as the work in modernization of the technical regulations for the aseismic design.

Professor Brčić was a member of many committees for the defence of doctoral dissertations and MA theses, and was a mentor for 16 defended doctoral dissertations, and

13 defended MA theses.

Professor Brčić also participated in the research projects at the faculties of civil engineering in Belgrade and Novi Sad. In Belgrade, he was a coordinator of the strategic project in civil engineering for four years.

During his working years, professor Brčić published over 70 scientific works (both in the country and abroad), he actively participated at the scientific meetings in the country and abroad, and he delivered the introduction lectures at the international meetings in Palermo, Rostock, Tbilisi, and Waterloo, Canada. He had a seminary in the Institute of Fundamental Sciences with the Polish Scientific Academy in Warsaw.

Professor Brčić actively cooperated in the work of our state organisations which dealt with organising and policy of the scientific-research work, so from 1958 till 1964 he was a president of the Committee for the civil engineering, water resources and traffic in the Federal Council for scientific work, and he was a member of the committees in the Republic association for the scientific work in Serbia.

Professor Brčić was very active in the Yugoslav Society for Mechanics, so from 1954 till 1962 he was its secretary general and from 1974 till 1978 its president.

From 1961 till 1993 professor Brčić was a standing editor in the referential journal *Zentralblatt für angewandte Mathematik und ihre Grenzgebiete* (Germany) and from 1973 he was a member of the editorial board of the American magazine "Research Mechanics Communications", Chicago USA.

Between 1978 and 1983 professor Brčić was a member of the European committee for mechanics, cooperating in organisation of the special courses "EUROMECHCOLLOQUIA" in the specific areas of Mechanics (two of those colloquies were held in Yugoslavia). For two years he was a delegate of Yugoslavia in the executive board of the International Union for Theoretical and Applied Mechanics, "IUTAM".

From 1973 till 1984 professor Brčić was a Head of the Mechanics Department in the Mathematical Institute of the SANU (Serbian Academy of Sciences and Arts). He was a member of the editorial boards of the following magazines: *Nase Gradjevinarstvo*, *Facta Universitatis*, Nis, *Scientia Yugoslavica*, Zagreb, *Gradjevinski Kalendar* (Union of the civil engineers and technicians of Yugoslavia) and from 1984 till 1994 he was the editor-in-chief of the *Gradjevinski kalendar* editions.

Professor Brčić collaborated for years with the *Gradjevinska Knjiga*, he was a member of the structure committee, and he was the president of the *Gradjevinska Knjiga Programme Council*.

Professor Brčić was a member of the following scientific organisations:

- GAMM (Gesellschaft für angewandte Mathematik und Mechanik), Germany
- SEM (Society for Experimental Mechanics), USA
- RILEM (Reunion International des Laboratoires et des Matériaux) France – for two years he was a member of holography board
- Yugoslav Mechanics Society
- Society of Designers of Yugoslavia
- SANU Mathematical Institute.

Professor Brčić wrote reviews for the articles in magazines and other publishing organisations: "Nase gradjevinarstvo", "Izgradnja", "Teorijska i primenjena mehanika", "Facta Universitatis", *Akademija nauka i umjetnosti BiH*, Sarajevo, *Jugoslavenska*

akademija nauka i umjetnosti, Zagreb, "Gradjevinski kalendar". Professor Brčić wrote reviews for the textbooks in the Strength of Material, Elasticity Theory and Mechanics of our civil and mechanical engineering faculties as well as the Natural-mathematical Faculty in Belgrade (21 different titles in total).

He wrote three entries for the Technical Encyclopaedia of the Yugoslav Lexicographic Institute: Holography, Strength of construction Materials and Vibrations in civil engineering.

Professor Brčić spoke several foreign language: English, German, French, Russian and Czech. He translated several books in the field of the theoretical and applied mechanics.

Professor Brčić spent most of his working life at the Faculty of Civil Engineering in Belgrade, at the Chair of technical mechanics and theory of structures. He was very esteemed and respected by his colleagues because of his outstanding human and ethic principles. He was very modest, unintrusive, measured and always apt to help and advise his younger associates. Working with him was characterised by peacefulness and optimism. It was a pleasure and honour to be professor Brčić's associate.

As a professor and pedagogue, professor Brčić was highly esteemed and respected by his students as well. He was one of the most favourite professors of many generations of students because of his most correct relationship towards them. He devoted his efforts to simplifying the complex and extensive matter from the disciplines he taught, and passing it on to his students. He will be remembered by his extremely interesting lectures and amphitheatres full of students, with no sponge or auxiliary papers. Let us mention one interesting case which took place at one of the lectures when professor Brčić talked about the effect of earthquakes on the structures. Exactly then, the earth began to tremble. To calm down the apparently frightened students, he continued to lecture commenting that there was no reason to be afraid since the building could easily withstand that intensity of earthquake.

Professor Vlatko Brčić has gone forever, and he was one of the most favourite professors of our Chair and the Faculty, who left a significant trace in the science and trade. We will cherish the memory of him and his deed with pride and respect.

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