DRAGOŠ M. CVETKOVIĆ - A BRILLIANT SCIENTIFIC CAREER THAT IS GOING ON

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In honor of Dragoš Cvetković on the occasion of his 75th birthday.

The year before (2016) was the 75th anniversary of the birth of Professor Dragoš M. Cvetković (born 1941 in Sremska Mitrovica, Serbia). On that occasion, in May 2016 in Belgrade, it was organized the conference "Spectra of Graphs and Applications 2016" and six papers of the conference, all dedicated to Professor Cvetković, were published in the previous volume (April 2017) of AADM, while some remaining papers are published in this volume.

Professor Dragoš Cvetković spent his whole active university career at Department of Applied Mathematics of Faculty of Electrical Engineering, University of Belgrade, and, after having retired, he continued his fruitful scientific work, which means that it has already lasted more than 50 years. He is an eminent and significant mathematician, very well known in the field of graph theory and some related disciplines, author or coauthor of a huge number of papers and books and, among them, several fundamental monographs, and one of few founders of the spectral graph theory. In Serbia he is one of the most significant and fruitful mathematicians, full member of the Serbian Academy of Sciences and Arts, educator of many scientists in the field of discrete mathematics and a teacher of many generations of students of electrical engineering.

As the result of his continuous and successful scientific work we have today some 230 scientific papers, published throughout the world, in various fields of discrete mathematics, with prevailing those of spectral graph theory. We have 78 books (including repeated editions) with various subjects and purposes (monographs, collections of articles, university textbooks, up to popular mathematical literature), but where a significant part is par exellance scinetific literature.

After his first papers in the various parts of graph theory, his substantial scientific beginning appeared to be extraordinarily fruitful: that was the work on his doctoral thesis, "Graphs and their Spectra". The shortened text of the thesis, published as a special edition of "Publikacije Elektrotehničkog fakulteta", attracted great attention and was read throughout the world. The appearance of that publication was important not only for Professor Cvetković, but also for the creating and development of spectral graph theory. Indeed, this text was starting point for writing his first important monograph: several years later appeared the book

- D. Cvetković, M. Doob, H. Sachs: Spectra of Graphs – Theory and Applications; Deutscher Verlag der Wissenschaften, Academic Press, Berlin-New York, 1980.

It is usually assumed that the year of birth of spectral graph theory is 1957 (A Colatz, U. Sinogowitz: Spektren endlicher Grafen, Collection of papers, University of Hamburg), and one can say with equal justification that the year of the appearance of that monograph was the moment of its majority and maturity. It is especially worth noticing that after only two years the second edition came out, which is something that occurs very rarely in the field of very specialized scientific literature, and particularly in theoretical mathematics. (So far this book had three English editions and a Russian translation.) In the coming years and decades, Cvetković's intensive work on spectral theory, besides a lot of papers, resulted in a set of first-rate monographs, which is just a real set of guidebooks through spectral graph theory and its development and applications:

- D. Cvetković, M. Doob, I. Gutman, A. Torgašev: Recent results in the theory of graph spectra; (Annals of discrete math. 36), North-Holland, Amsterdam-New York-Oxford-Tokyo, 1988.

- D. Cvetković, P. Rowlinson, S. Simić: Eigenspaces of graphs; Cambridge University Press, Cambridge, 1997.

- D. Cvetković, P. Rowlinson, S. Simić: Spectral generalization of line graphs; Cambridge University Press, Cambridge, 2004.

- D. Cvetković, P. Rowlinson, S. Simić: An introduction to the theory of graph spectra; Cambridge University Press, Cambridge, 2010.

Together with these important books one must certainly mention a monograph that formally does not belong to spectral theory, but represents in a way an inverse method, developing matrix theory by means of graph theory and some additional combinatorial techniques:

- R. Brualdi, D. Cvetković: A combinatorial approach to matrix theory and its applications, CRC Press, Boca Raton- London - New York, 2009.

It is also worth mentioning that Cvetković has been engaged in such problems for a long time ago and yet in 1980 he published the book on that subject, which, as having been published in Serbian, did not attract adequate attention.

The fact that the development of graph theory always has got its stimulus by the necessities of classical sciences (physics, chemistry) and, on the other hand was strongly speeded up through the development of computer science and modern technologies, can be perceived and realized by following the interests and engagements of Professor Cvetković and contents of mentioned monographs. In a significant part of his career he was interested, among others, in applications to chemistry, which was also naturally induced by his long and close collaboration with academician Professor Ivan Gutman, an eminent scientist, both a chemist and a mathematician, who has given an immense contribution to connections between graph theory and chemistry. Papers in this field in which Cvetković was author or coauthor were also reviewed in "Chemical Rewievs". In later years Professor Cvetković moved his focus to applications to computer science and also published a considerable number of papers and some books of collected articles.

Besides his immeasurable contribution to spectral graph theory, from time to time Professor Cvetković used to go in for some other parts and problems of graph theory, and thus there are his papers about trees, coloring, factorization etc. Also, there are papers from other parts of discrete mathematics, especially mathematical logic and elements of artificial intelligence, then from computer science and operational research (including a book on traveling salesman problem).

In a period of his full scientific maturity Cvetković initiated and organized the work on an interactive programming system, called "Graph", intended for researchers in graph theory, and was intensely dedicated to the realization of that project. In fact, "Graph" had many characteristics of an expert system, facilitated the work of many people and justified its creating. Nowadays, we have its improved successor – "Newgraph".

The whole scientific work of Professor Dragoš Cvetokvić is large, abundant and complex and a final evaluation and estimate of it might only be the subject of a special scientific deed. But anyhow, the main and most important course of it – the founding and work on spectral graph theory, can be followed through the main publications – the monographs published by first-rate editors, from which one can easily comprehend a great influence of his work to this scientific field. By those books spectral graph theory was constituted as a compact theory, with its methods, techniques, scopes, ranges and limits, as well as its applications to other sciences. Among those books the first one is at the same time the most significant one; the book "Spectra of graphs – theory and applications", using the words of Professor Peter Rowlinson, "will doubtless be the Bible for researchers in this field". A huge number of citations of his books and papers, which is measured in thousands, is a firm and reliable evidence of his scientific influence; it tells about a lot of people who leant their investigations upon results of his papers or systematised theoretical foundations of his books. The book "Spectra of graphs – theory and applications excels in the number of citations. His influence can also be understood through

a lot of particular facts and data of his biography: he was a visiting professor or an invited guest at many universities, and invited speaker at many specialized and other conferences, organizer of two workshops on algebraic graph theory, the chairman of the programming committee of two workshops on spectral graph theory, a member of the International Academy for Mathematical Chemistry, a member of the Academia Europaea (London). Among this multitude of details that tell about his scientific reputation, let us only add that he was member of Editorial Board of the "Journal of Graph Theory" for a period from its beginning, one of the editors of "Linear and Multilinear Algebra", and is now in the Editorial Board of "Ars Mathematica Contemporanea" and "Transactions on Combinatorics". In 2011 a special issue of "Linear Algebra and its Applications" came out in honor of Dragoš Cvetković, on the 70th aniversary of his birth.

As for our journal "Publikacije Elektrotehničkog fakulteta – serija matematika" ("Publications of the Faculty of Electrical Engineering – mathematics series"), whose successor AADM has been since 2007, it should be underlined that Professor Cvetković was its Editor-in-Chief in the period 1990-2000 and that under his leadership the journal started publishing papers from the field of discrete mathematics to greater extent. In that period and afterwards, apart from presenting meaningful scientific results, he used to find ways, through detailed statistical analysis by a series of articles (with several collaborators) that contained various types of reviews of "Publications", to provide insight in distribution of achieved results from the journal over major mathematical fields.

The significance and the role of Professor Cvetković in the development and the progress of mathematics in Serbia is extraordinary and very specific. Professor Gutman once said that mathematics in Serbia before and after the appearance of Dragoš Cvetković has not been the same mathematics. His work and results established and affirmed new disciplines, which until then were scarcely present in university curricula and minds of mathematicians and engineers, as important and unavoidable parts of modern mathematics, directed to many applications and open for abundant scientific work. Discrete mathematics became a natural subject of interest, and especially graph theory. Besides, the complete engagement and contribution of Professor Cvetković in the development of mathematics in Serbia is immeasurable. Countless activities at Faculty of Electrical Engineering, Belgrade University, other universities, the Academy, Mathematical Institute, state bodies for supporting scientific work, at a lot of conferences and elsewhere, editing of mathematical journals and membership in editorial boards – all those activities during half a century are certainly built in the present progress. His collaboration and work with a lot of people (eight doctoral students, among them some eminent scientists, who have educated new generations of scientists) and collected results of his and his successors simply mean that he made a school of graph theory in Serbia.

In 2016, Professor Cvetković published four scientific articles and two books came out in repeated editions. His career is going on.

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