

## Professor Constantin Corduneanu and the Iași School of Differential Equations

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Constantin Corduneanu is one of the most outstanding Romanian mathematicians. He has been active in mathematics for almost seven decades, both in Romania and in the United States, covering several fields, such as: almost periodic functions, the theory of differential equations (including existence, boundedness, stability of solutions, periodic and almost periodic solutions), equations with causal operators, optimal control problems for systems with Volterra operators, etc.

### Short Biography

Born on July 26, 1928, in Potângenii-Movileni, Iași County (Romania), Constantin Corduneanu studied mathematics at the *Alexandru Ioan Cuza* University of Iași, starting 1947. After graduation he was hired by the Department of Mathematics of the same university where he served until 1978 when he emigrated from Romania to the United States. There, after short stays at the University of Rhode Island and the University of Tennessee at Knoxville, he was offered a position at the University of Texas at Arlington where he served until his retirement (1996).

Starting from his Romanian period, Professor Corduneanu has published many papers on his favorite subjects in top international mathematics journals. His books have been published by prestigious publishing houses, such as: The Romanian Academy Publishing House (Editura Academiei), John Wiley & Sons, Allyn and Bacon, Chelsea Publ. Co., Cambridge Univ. Press, Taylor & Francis, Springer.

Professor Constantin Corduneanu has also been very active by presenting his scientific results at numerous scientific events or by delivering lectures at various institutions around the world. In particular, in 2006 I invited him to teach a short course at the Central European University, Budapest.

Professor Constantin Corduneanu had several administrative positions in Romania: Dean of the Faculty of Mathematics of the *Alexandru Ioan Cuza* University (1968-1972), Vice-Rector of the same university (1972-1973, 1974-1975), and Rector of the Pedagogical Institute in Suceava (1967). These positions have increased his visibility

and prestige. This is why his unexpected decision to emigrate from Romania to the USA (in 1978) has been a destabilizing event for the then communist regime in Romania.

Here are some titles and distinctions that he has received throughout his career:

- Corresponding member of the Romanian Academy since 1974 (title retracted after emigration, reinstated in 1990), and full member since 2013;
- Romanian Ministry of Education Prize (1963);
- The *Gheorghe Lazăr* Prize of the Romanian Academy (1965);
- Merit Medal of the Czech Mathematical Society (2001);
- honorary doctorates from several Romanian universities (Iaşi (1994), Constanţa (1994), Braşov (1999), Suceava (2003), Târgovişte (2015)) and from the Ural Federal University, Ekaterinburg (2010).

### **On Professor Corduneanu's contribution to the development of the Iaşi school of differential equations**

As a student and professor at the *Alexandru Ioan Cuza* University, Constantin Corduneanu benefited from the stimulating local mathematical environment created and led by Professor Alexandru Myller (1879-1965). At that time the education system in Romania was under the influence of the Soviet Union, so cooperation with western institutions was impossible. However, Russian mathematics was of a high scientific level, so that Romanian mathematicians had access to valuable mathematics journals and books in Russian (many of those books being translated into Romanian). On the other hand, in Romania, including in Iaşi, the excellent traditions of the period before the Second World War were preserved.

Before providing details on Professor Corduneanu's contribution to the development of the school of differential equations at the *Alexandru Ioan Cuza University* of Iaşi, let us first make a short presentation on the evolution of mathematics at this university.

Romanian research in advanced mathematics originated about the beginning of the 20th century and was largely due to the influence of French mathematics. It is worth pointing out that, although advanced mathematical research began later in Romania as compared to Western Europe, the international scientific level was then shortly reached. At the end of the 19th century and during the first decades of the 20th century, some young Romanians went to Paris and obtained doctorates in mathematics there. E.g., Spiru Haret (1851-1912, born in Iaşi) obtained his PhD in Mathematics from the Sorbonne (University of Paris) in 1878, being the first

Romanian to obtain a PhD degree in Paris. After his return to Romania, he ran, as Minister of Education, a complete reform, thus building the modern Romanian education system. Then, some other Romanian students obtained doctoral degrees in mathematics from the Sorbonne: Gheorghe Țițeica in 1899, Dimitrie Pompeiu in 1905, Traian Lalescu and Constantin C. Popovici in 1908, Simion Sanielevici in 1909, Simion Stoilow in 1916. On the other hand, Alexandru Myller obtained his PhD from the University of Göttingen in 1906, being supervised by David Hilbert.

After their return to Romania all these mathematicians contributed to the development of the mathematical education and research within the Romanian higher education system. Some of them had positions at the *Alexandru Ioan Cuza* University of Iași. In particular, Alexandru Myller (1879-1965) is considered the founder of the Iași mathematical school. Among his PhD students were: Octav Mayer (1895-1966, the first to obtain the PhD degree from a Romanian university), Ilie Popa (1907-1983), Gheorghe Gheorghiev (1907-1999), Adolf Haimovici (1912-1930). Alexandru Myller created at the *Alexandru Ioan Cuza* University a strong school of geometry in cooperation with Octav Mayer.

We also have to mention the influence of the Italian mathematician Tullio Levi-Civita (University of Rome) on the Iași mathematical community. Specifically, Gheorghe Vrânceanu (1900-1979) and Mendel Haimovici (1906-1973) prepared their PhD with Professor Tullio Levi-Civita and successfully defended their theses in 1924 and 1932, respectively.

Besides geometry, the main research fields that were covered in Iași during the 20th century where: algebra, analysis, mechanics, and differential equations. Concerning differential equations, there were several mathematicians in Iași who did research in this field: Alexandru Myller (during his Göttingen period), Simion Sanielevici (1870-1963), Constantin Popovici (1878-1956), Adolf Haimovici, Mendel Haimovici. However, only some professors conducted seminars and PhD theses in this field.

First of all, Professor Adolf Haimovici initiated and conducted the *Seminar of Functional Equations and Numerical Analysis* which lasted a long period of time and attracted many researchers working on subjects in the field of differential equations and their numerical integration. Let us point out that over 30 mathematicians prepared their PhD theses under his supervision. I am proud to say I was one of the PhD students supervised by Professor Adolf Haimovici and attended the last meetings of his interesting seminar.

A bit later, Professor Constantin Corduneanu founded his *Seminar on Qualitative Theory of Differential Equations*, similar to that initiated in 1953 at the University

of Bucharest by Professor Aristide Halanay (1924-1997), thus laying the foundations of this research direction in Romania. I attended some of the sessions of the seminar led by Professor Corduneanu, where I found a creative and animated atmosphere. I am talking about the period 1975-1978 when the communist regime in Romania was more permissive than before, so Professor Corduneanu had the possibility to invite mathematicians from abroad to give talks. At that time he was already well known within the community working on his subjects of interest. Certainly this seminar contributed considerably to the development of the Iaşi school of differential equations and towards connecting the local differential equations community to the international mathematics community. Unfortunately, in 1978 Professor Corduneanu decided to leave Iaşi thus discontinuing his great seminar. Fortunately, in the meantime, his former student Viorel Barbu (PhD student of Professor Adolf Haimovici, currently a member of the Romanian Academy) has initiated the *Seminar of Differential Equations and Control Theory* which successfully continued the great story of the Iaşi school of differential equations.

Undoubtedly, all the three seminars described above represented strong incentives for all the local researchers working in the field of differential equations under the communist restrictions that existed in Iaşi before the Romanian Revolution (1989).

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