

# A TRIBUTE TO PROFESSOR CABIRIA ANDREIAN CAZACU

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Professor Cabiria Andreian Cazacu was born in Iași on 19th February 1928 and passed away on 22nd May 2018 in Bucharest, Romania.

She was a professor at the Faculty of Mathematics of the University of Bucharest from 1949 until 1993. Between 1976 and 1984 she was the dean of the Faculty. After 1993 she became a consultant professor. In parallel, between 1951 and 1969 she was a researcher at the Institute Mathematics of the Romanian Academy.

She defended her Ph.D. thesis entitled *Normally exhaustible Riemann surfaces* in 1957, under the supervision of Simion Stoilow. In 1964 she received the prize of the Ministry of Education and in 1968 she received the ‘S. Stoilow’ prize of the Romanian Academy. Since 2006 she has been an honorary member of the Romanian Academy.

Professor Andreian Cazacu is the author of more than 100 scientific papers and 6 books. Her monograph *Theorie der Funktionen mehrerer komplexer Verndlichen*, appeared in 1973 at Birkhauser. She collaborated with Simion Stoilow for the second volume of his monograph *Theory of functions of a complex variable*, published in 1958. She worked in several areas of Complex Analysis, such as the topological theory of analytic functions, quasiconformal mappings, the theory of Riemann and Klein surfaces, functions of several complex variables, Nevanlinna theory on value distribution.

The period 1950-1960 is the time when Simion Stoilow initiated and conducted his well-known seminar at the Institute of Mathematics, and was a period of maximum flourishing of Romanian Mathematics in general and of Complex Analysis, in particular. At that time Bucharest became a well-known mathematical center producing numerous personalities, such as Nicu Boboc, Corneliu Constantinescu, Aurel Cornea, Petru Caraman, Cabiria Andreian Cazacu, Martin Jurchescu. This was the intellectual environment in which Cabiria Andreian grew and developed scientifically. She became a close collaborator of Simion Stoilow and continued her activity in his famous topological theory of analytic functions. This theory was created and developed by S. Stoilow as an answer to a famous problem of that time introduced by Brouwer, namely that of characterising from a topological point of view the behavior of analytic functions.

Together with G.T. Whyburn, Cabiria Andreian Cazacu is the main continuator of Stoilows work in the topological theory of analytic functions.

With her Ph.D. thesis as a starting point, she studied more general classes of Riemann coverings, such as the partial regular exhaustible coverings, the class of E-quasinormal exhaustible coverings, the  $A_\infty$  coverings of L.I. Volkovski, the class of complete coverings of S. Kobayashi, R. Nevanlinna and L.I. Volkovski and the class of quasitotally exhaustible coverings, which are a topological analogue of the regular exhaustible coverings of L. Ahlfors.

She proved many generalizations of the disks theorem and of Hurwitz-Riemann-Stoilows theorem. She also established the structure of the level lines of the conjugate of the module function on non-compact Riemann surfaces. She also showed that Kleins coverings can be defined in a similar way to Riemanns coverings, extending Stoilows theory regarding such coverings and showed that the morphisms of Klein surfaces are interior mappings.

In the Nevanlinna's theory of value distribution she proved a deep dependence between these values and the module of exhaustion.

Cabiria Andreian Cazacu had an important contribution in the field of quasiconformal mappings. She considered not only the quotient of the dilata-

tion of the infinitesimal ellipses, but also the orientation of the characteristics of the infinitesimal ellipses, obtaining in this way new classes of mappings, namely  $O$ ,  $O'$ ,  $O''$ . For instance, she showed that the solutions of the extremal problems of Teichmüller or Grötzsch type are in the class  $O''$ .

She intensively studied classes of mappings satisfying new modular conditions and proved theorems of Fatou, Nevanlinna-Frostman and Beurling type in such classes.

The  $\omega$ -weight modulus was introduced and used by Cabiria Andreian Cazacu on Riemann surfaces, for solving some extremal problems and generalizing the inequalities of Grötzsch and Rengel. These formulae regarding inequalities concerning the weight modulus were used by B.V. Sabat, R. Kühnau, E. Reich and W. Walczak and were again found a few years later by Rodin, Mateljevic, Markovic and Martio. The weight modulus has been used, 30 years after it was introduced by Cabiria Andreian Cazacu, by many mathematicians for solving geometric and analytic problems which appeared in the study of new classes of mappings such as mappings of finite distortion with the dilatation in the BMO class, or such that  $\exp(A \circ K)$  is integrable, where  $A$  is an Orlicz map and  $K$  is the dilatation of such mapping.

A special class related to quasiregular mappings is the class that has as basic objects open, discrete mappings distinguished by moduli inequalities, at least one being a weight modulus. Such an approach was first proposed by Martio and summarized in the monograph written with Ryazanov, Srebro and Yakubov. Using the modulus method, many properties of these mappings are shown to be similar to those satisfied by quasiregular ones.

Cabiria Andreian Cazacu was a tireless organizer of international conferences of complex analysis. Among others, she was one of the main organizers of eleven editions of the Romanian-Finnish Seminar, which are part of the collaboration in complex analysis and potential theory between Romania and Finland, founded by R. Nevanlinna and S. Stoilow. The proceeding papers of four of these seminars, for which she was an editor, appeared in Springer Lecture Notes in Mathematics series (the volumes 743, 783, 1013, and 1014).

Together with R. Nevanlinna she edited the monograph of A. Dinghas on the theory of value distribution. She was also an editor of the volume *Analysis and topology* dedicated to Simion Stoilow that was published by World Scientific in 1998.

She supervised the following PhD students: Dorin Ghişa (1974), Dumitru Ivaşcu (1978), Monica Frunză (1979), Ilie Bârză (1980), Mihai Cristea (1990), Victoria Stanciu (1994), Monica Roşiu (1999), Camelia Beznea (2000), Marcelina Mocanu (2000), Elena Rusu (2000), Emilian Costache (2004), Ser-

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afima Cerchez (2007), Carmen Boloșteanu (2008), and Dan Dogaru (2010).

As her student and collaborator for over 35 years, I remember her as a person of rare modesty and simplicity, the like of which I have never encountered in my life. Although seemingly a fragile person, she was very hard-working and resolute, qualities that were added to an incredible creative power.

Her life, her personality and her scientific work have been a model and a source of inspiration for generations of students, collaborators and colleagues. Her passing over is a great loss for the Romanian mathematical community.

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