

S I M I O N S T O I L O W

Simion Stoilow was born in Bucharest on September 14, 1887. His father was a military officer who died in 1901 with the rank of general. He belonged to a Serbian family with aristocratic roots that had taken refuge in Rumania from the old Serbia. His mother, who died in 1931, was a descendant through her father from the family Greceanu, renowned in Rumania through its many members who played a role in the culture of the country or were high officials (including e.g. Prince Michael the Brave). Through her mother she was a descendant of the family Bengescu, which also played a certain role in Rumanian history. Whoever studies the genealogical tree of Stoilow ([B] page 290) has unavoidably the impression of reading a text from history. Stoilow spent his childhood in Craiova, the chief town of Oltenia, from where his parents originated. There he attended elementary school (1895-1899), as well as secondary school (1899-1907). In 1907 he went to Paris, where he studied mathematics at the Sorbonne. Among his professors there were Emile Picard, Emile Borel, Henri Lebesgue, Edouard Goursat and Jacques Hadamard. Stoilow obtained his licentiate's degree in 1910 with a work in the theory of partial differential equations. Carrying on his studies, he started his work for his Ph.D. under the supervision of Emile Picard, which he finished in 1914. The defense of the thesis [4] was, however, delayed until 1916, because he was obliged to return to Rumania during this time in order to fulfill his military

service. In the summer of 1916, when Rumania entered the war, Stoilow was mobilized as a second lieutenant in the corps of engineers and took part in the battles in the Dobruja and later in Moldavia. After the war he held short-term positions at university levels (The School of Bridges and Roads (named later on Polytechnic School) of Bucharest 1919, The University of Iasi 1919-1921, The University of Bucharest 1921-1923) until he became full professor at the University of Cernăuți (Czernowitz) on the 1st of April, 1923. There he remained for 16 years, which he considered to have been the most productive years of his life. The town of Cernăuți (mentioned in the chronicles for the first time in 1408 as a customs center of the principality of Moldavia) belonged from 1775 to 1918 to the Austrian monarchy (capital of the Kronland Bukowina). The University was founded in 1875 and had Hans Hahn (to whom Stoilow dedicated an article ([B] page 215) and Joseph Plemelj as professors of mathematics. After World War I most of the professors left the University and the mathematics lectures were given by non-specialists. As part of the reorganization Stoilow became the first professor of mathematics. Thus, besides his scientific and didactic activity, he was obliged to invest a lot of time and energy in order to organize the faculty of science, the dean of which he was twice (1925-26 and 1932-39). In 1939 (i.e. one year before the Soviets occupied Cernăuți) Stoilow transferred to the Polytechnical School of Bucharest (as the successor of Gheorghe Țițeica) and in 1941 to the University of Bucharest (as the successor of Dimitrie Pompeiu). He remained at the University until February, 1961. During 1944-46 he was the rector of this university and from 1948 to 1951 the dean of the Faculty of Mathematics and Physics. During 1946-48 Stoilow was Minister Plenipotentiary of Rumania in France. In 1949 the Institute of Mathematics of the Rumanian Academy was founded. Stoilow refused the post of director which was offered to him in favour of Dimitrie Pompeiu and became the

vice-director, but in practice the Institute was ruled by him. In 1954, when Dimitrie Pompeiu died, Stoilow became director of the Institute formally as well, a position which he held until his death. Stoilow devoted a very large amount of work and part of himself to the Institute of Mathematics, and he succeeded in creating a small island of sanity there, where research work was possible, in the middle of the horror spread by a political terror unprecedented in the annals of Rumania. It was also a place, where many young mathematicians, who for political reasons had no chance of getting a position elsewhere, found a kind of asylum and could survive scientifically. Unfortunately, this Institute of Mathematics which played an important part in the formation of a new generation of mathematicians in Rumania was abolished in 1975 by an arbitrary presidential decree (more information about the Institute of Mathematics of the Rumanian Academy may be found in [D] and [E]). On April 4, 1961 Stoilow died of a heart attack during a period of full and creative activity.

Stoilow was married three times. The first marriage was entered into in Paris in 1914 with Marceline Vaurais, born at Clermont Ferrand in 1893. She could not adapt to life in Rumania and the marriage was dissolved in 1920. The second wife, Jenia Valerianova Osinski, born 1903 in Russia, of Lithuanian origin, died in Bucharest in 1940. The marriage took place in Cernăuți in 1929. In 1947 Stoilow married Paula Froda (born Lerner, 1900-1974) the former wife of the mathematician Alexandru Froda in Bucharest. She was a great moral help for him in these years of difficult moral struggle. None of these marriages brought children. More information about Stoilow's personal life may be found in [A] page 60, [B] page 9, and [75] page 22.

In his research activity Stoilow concentrated on three mathematical areas each quite distinct from the others. In the first period, from 1910 to 1917, under the influence of Emile Picard he worked in the theory of partial differential equations, more precisely on the study of the singularities of the solutions of linear partial differential equations in two complex variables. The problem was opened by the papers of Delassus (1895) and Le Roux (1898), which are generalized by Stoilow. One can see that Stoilow grasped the nucleus of these problems in the sense in which modern mathematics attacks them, but it was only after the Second World War that the necessary tools for understanding the nature of these singularities were created.

In 1919 Stoilow changed his research direction abruptly and devoted himself to the theory of real functions, which had been created at the turn of the century by Baire, Borel and Lebesgue. Here is the main result obtained by Stoilow in this field [14]. Let f be a continuous real function on an open interval of the real line \mathbb{R} and for every $\xi \in \mathbb{R}$ let A_ξ be the set of points $x \in f^{-1}(\xi)$ such that there exists a non-empty open interval I of \mathbb{R} with one endpoint equal to x so that $I \cap f^{-1}(\xi) = \emptyset$. Then there exists a Lebesgue null set $A \subset \mathbb{R}$ such that for every $\xi \in \mathbb{R} \setminus A$ the following holds:

- a) for every $x \in A_\xi$ the left lower (upper) derivative of f at x is equal to the right upper (lower) derivative at x ;
- b) the function f is differentiable at every isolated point of A_ξ ;
- c) if the one-sided derivatives on $f^{-1}(\xi)$ are bounded (finite) then $f^{-1}(\xi)$ is finite (countable).

This remarkable theorem contains in it a great amount of information and many theorems in this field may be easily deduced from it. Unfortunately, the theorem was ignored to a great extent by the mathematicians working in this area.

Stoilow's main results belong to the theory of functions of one complex variable, in which he began working in 1927. By solving Brouwer's problem to give a topological characterization of analytic functions (in 1928) he lays the foundations of a new mathematical branch, the topological theory of analytic functions. The central concept of this theory is the notion of interior map, which was introduced by Stoilow [17]. A continuous map between two surfaces is called interior if it is open (i.e. maps open sets into open sets) and 0-dimensional (i.e. the inverse image of a point is totally disconnected). Here are the main results obtained by Stoilow in this field.

Theorem 1 [17], [18]. If $f : S \rightarrow T$ is an interior map then $f^{-1}(y)$ is discrete for every $t \in T$ and for every $x \in S$ there exist neighbourhoods U and V of x and $f(x)$ respectively, a homeomorphic map g (resp. h) of U (resp. V) on the unit disc in the complex plane, and a natural number n such that

$$h \circ f \circ g^{-1}(z) = z^n$$

for every z in the unit disc.

Theorem 2 [26]. If f is an interior map of a domain U of the complex plane into the Riemann sphere then there exist a domain V of the complex plane

and a homeomorphism $g : V \rightarrow U$ such that $f \circ g$ is analytic. Later [40] Stoilow replaced the domain U by a surface and V by a Riemann surface.

Theorem 3 [31], [33]. A surface is homeomorphic to a Riemann surface iff there is an interior map of the surface into a Riemann surface.

All these results were published later by Stoilow in his celebrated book "Leçons sur les principes topologiques de la théorie des fonctions analytiques" [40]. In it one also finds the topological ideal boundary of a Riemann surface (page 85), which today is called the Kerékjártó-Stoilow boundary. After World War II, when the metric ideal boundaries of Riemann surfaces were defined, it turned out that for all these boundaries the points of the Kerékjártó-Stoilow boundary correspond to the connected components of these boundaries. The book appeared in a second edition in 1956 (to which the papers [34], [45], [46], and [54] were added) and in 1964 in Russian translation [67].

Another important result of Stoilow refers to a class of analytic maps introduced by him under the name of maps with the Iversen property [25]. A meromorphic function f defined on a Riemann surface R has the Iversen property if for every $z \in R$, every path Σ on the Riemann sphere with its origin at $f(z)$, every neighbourhood U of the extremity of Σ , and every neighbourhood V of Σ there exists a path Σ' on R starting at z so that $f(\Sigma') \subset V$ and the extremity of Σ' is mapped into U . Stoilow dedicates 12 papers to this property. He proves that if f has the Iversen property then for every point of the Kerékjártó-Stoilow boundary of R the cluster set of f at this point is either the whole Riemann sphere or reduces to a point. If this last case holds for

all points of the Kerékjártó-Stoilow boundary then there exist a natural number n and a totally disconnected set K such that every point outside of K is covered exactly n times (the points of K are then taken less than n times). The result of Iversen, proved in 1914, consists in the proof that the inverse function of an entire function has the above described Iversen property. Stoilow generalizes this result showing that the functions defined by a relation of the form $f(x,y) = 0$ have the Iversen property, where f is an entire function of two variables [34]. Later [45] Stoilow proves that every meromorphic function defined on a parabolic Riemann surface has the Iversen property. In [47] he replaces for the whole theory the Riemann sphere as range of values by an arbitrary Riemann surface.

We will content ourselves with this information concerning Stoilow's research activity. The interested reader can find more details in [77] pages 9 and 27, [A] page 68, [B] pages 55, 147, 172, and 297, [C] page 8, as well as in his collected papers [76]. Besides the research activity Stoilow wrote papers on the history and the philosophy of mathematics. These papers can be found in [77] and [B].

The portrait of Stoilow would not be complete if we would not reveal the part he played in the development of mathematics in Rumania. Rumania joined the international mathematical community in the last century, mainly under the influence of the French mathematical school (the German and the Italian influence was rather small). Roughly speaking, one may consider Stoilow as belonging to the third generation of mathematicians in Rumania (the first generation included e.g. Spiru Haret (1851-1912) and David Emmanuel (1854-1941) and the second one Gheorghe Titeica (1873-1939), Dimitrie Pompeiu (1873-1954), and Traian Lalescu

(1882-1929). When he started his mathematical activity in Rumania, in 1919, Stoilow was confronted with the lack of a long tradition, which implies a lack of substructure and so with the obligation to invest a great part of his energy in organisational activities. The fact that he spent a long part of his active time in Cernăuți aggravated this aspect. Only after 1941, when he became professor at the University of Bucharest he was in a more comfortable situation, but he could not take advantage of it because of the war. After the war, as we saw above, Stoilow became involved in nonmathematical activities and this explains why the "Stoilow School" was formed only after 1950. At about this date the "Stoilow Seminar" begins to function with weekly meetings, first in his office at the university, later in the building of the Institute of Mathematics (Str. Mihail Eminescu 47). A great part of the analysts who matured at this time in Bucharest participated at this seminar (some of them only temporarily). At the beginning the participants gave short expositions of the papers which Stoilow received from all over the world. In the course of time presentations of original results were added, and later long series of systematic expository lectures on, for instance, quasiconformal maps, potential theory, the theory of several complex variables, currents, Teichmüller spaces, category theory, dimension theory, etc. At the University Stoilow lectured regularly on function theory. For this course he wrote a text-book [71], [72] which developed later into the first volume of his book on function theory [73]. In addition he gave more advanced lectures in this field on varying themes, and these became the basis of the second volume of the above mentioned book [74] (the second volume was written in collaboration with Cabiria Andreian Cazacu). This book was translated later into Russian [75].

Working in function theory it was unavoidable for Stoilow to enter into scientific contact with Rolf Nevanlinna, who was incontestably the world leader in this field. By Stoilow's initiative Nevanlinna became Doctor honoris causa of the University of Bucharest. In the course of time a friendship developed between these two remarkable mathematicians who shared many similar psychological features. In a certain sense they transmitted their friendship to their pupils. Since 1969 it has become a tradition to hold a series of international mathematical meetings from time to time, alternatively in Rumania and in Finland, under the name of Romanian-Finnish Seminar (1969, 1973, 1976, 1978, 1981; the sixth meeting has not yet taken place, because of difficulties created by the Rumanian political authorities).

Some words about the Fourth Congress of Rumanian Mathematicians are appropriate. During the war, and the misery which followed, scientific contacts were inevitably reduced. Unfortunately this misery lasted in Rumania for many years beyond the war for political reasons. The Soviet army occupied the country and installed a government against the will of the people which executed the orders of Moscow. As a consequence the Soviet slogan of the "fight against cosmopolitanism" was immediately transferred to and applied in Rumania. The term took Orwellian features in Rumania, since besides its general terroristic function it was used also in the direction of the russification of the country (e.g. the citation of a Rumanian author instead of a Russian one was sometimes dangerous, since it represented the crime of "cosmopolitanism"). During this time the import of "capitalistic" scientific periodicals was forbidden. Earlier, for instance, the library of the Faculty of Mathematics of the University had received the *Comptes Rendus Acad. Sci. Paris* (free of charge, due to the personal relations of

Stoilow). Now this journal was refused by the Board of Censors (which officially did not exist). In a sadly remembered furious article referring to the fight against cosmopolitanism in Rumanian mathematics prominent Rumanian mathematicians were attacked, Stoilow being one ^{of} the main targets. After Stalin's death, during the year 1954, we felt the first effects of the thaw in Rumania which started in the Soviet Union during the beginning of Khrushchev era. Stoilow immediately took the decision to use the small political relaxation in order to hold the Fourth Congress of Rumanian Mathematicians. His initiative was successful and the congress took place in the summer of 1956, i.e. some months before the political troubles in Poland and the revolution in Hungary (after which the political thermometer fell again). The Congress was a huge success, since many prominent mathematicians from all over the world participated, and the young Rumanian mathematicians had the occasion to enter into direct contact with these mathematicians and with modern mathematics. (At this time a passport allowing a visit to a country outside the Soviet block was something unimaginable for these mathematicians.) For many of them this congress was decisive for their whole mathematical career.

Stoilow not only was a great mathematician and a man of wide culture, but at the same time a man of great kindness and of quite unusual delicacy. Those who had the great privilege, as the author of these lines had, to know him personally, will not forget the uncommon spell he spread around him. In the middle of the communist terror, which ruled over Rumania in the fifties, Stoilow tried repeatedly (and sometimes successfully) to save many people from desperate situations. I consider that it is my moral duty to record some information in written form, which cannot appear today in Rumania and risks being lost. Otherwise

history would preserve an incorrect picture of this great man. Unfortunately I have no access to the required documents, so I see myself obliged to relate some disparate facts, which I know by chance.

Stoilow gave his usual lecture on function theory when I was his student in the third year of studies. He did not have a strong voice, so the students used to sit in the first rows in order to hear better, and they were very quiet. Stoilow was not the kind of public speaker who enraptures his listeners with resonant sentences and theatrical gestures. But he electrified his audience in a more subtle way, by the intellectual elegance of the lecture. He succeeded in being very rigorous without losing suggestive power and although his lecture was well organized and prepared, one felt no lack of spontaneity. At the end of my study I prepared my master's thesis with Stoilow. Finding out my difficult political situation, which obliged me practically to give up the career of a mathematician, Stoilow fought with might and main in order to help me, without success for a time. The post of Assistant to his chair as well as the position of research fellow at the Institute of Mathematics were refused by the respective appointment boards. At every institution in Rumania there existed an appointment board keeping huge files of hundreds of pages (kept strictly secret) on every employee and having the right to veto all appointments. Stoilow did not give up and continued to fight with the means he had at his disposal. Cleverly and quietly taking advantage of the political disorientation produced by the shocking events which followed a short time after Stalin's death, as well as a fortuitous local event, he succeeded in obtaining a temporary position for me at the Institute of Mathematics. There I had the opportunity of learning to know him better and the chance to appreciate the unusual generosity, warmth, delicacy, and tact of this

great mathematician. The secretarial staff of the Institute, generally highly educated persons but "tainted" politically, literally adored him, and the same held for many young and older mathematicians at the Institute. His efforts to keep the library of the Institute at a reasonable level deserves special mention; here too he succeeded in working wonders.

Those who know what communist terror means will appreciate his courage to face the political authorities to fight to save established or young mathematicians and his efforts for the liberation from the political prisons of many personalities of the country. And the fact that this fight succeeded in some cases (as it happened for his older brother, the general Constantin Stoilow, and the former minister Ion Fintescu) is almost a miracle. In the case of the mathematician Radu Roşca he had no success. Radu Roşca was arrested under the absurd charge of spying for a foreign power. As a matter of fact it had been proposed to him to collaborate with the communist regime, and his refusal was punished with a sentence of 25 years of prison. Stoilow initiated a written petition in his favour, which was signed by several members of the Rumanian Academy and was addressed to Petru Groza, the prime minister at this time (in fact a political puppet). In answer the authorities asserted that Professor Radu Roşca could not be set free, since he was not re-educable. Radu Roşca was released in 1963 only (after almost 14 years of prison) due to the personal intervention of Charles de Gaulle.

The case of Ion Fintescu deserves to be told in more detail. Fintescu was a former schoolmate and a childhood friend of Stoilow's. During the second world war they participated together in one of the many initiatives that were undertaken in

order to reach an armistice. In this connection they had frequent meetings with vice-prime minister Mihai Antonescu (a former student of Fiñtescu), Iuliu Maniu (the president of the National-Peasant Party), and Lucrețiu Pătrășcanu a prominent member of the Communist Party, who lived at this time under house arrest at Poiana Țapului¹. During the discussions with Mihai Antonescu the conclusion was reached that it would be useful to have Fiñtescu in the government, so he became minister of economy. After the Communists assumed power he was sentenced to 8 years in prison for collaboration. Stoilow was appointed Minister Plenipotentiary for France in 1946. This appointment is to be explained by the desire of the Rumanian government to have a distinguished personality in Paris during the peace negotiations. From this position Stoilow fought untiringly for the liberation of Fiñtescu. Seeing that his struggle had no success, he presented an ultimatum to Ana Pauker, the Foreign Minister of Rumania, stating that he would give up his position if Fiñtescu were not freed. The ultimatum worked and Fiñtescu was set free. During his stay in Paris he succeeded in obtaining a pension for the Rumanian musician George Enescu (who lived in Paris in financial difficulties) from the Rumanian government. After the conclusion of the peace treaty the presence of Stoilow in Paris became undesirable for the Rumanian government. In 1948, during his vacation in Rumania, his stepdaughter (who was studying at a

¹ Mihai Antonescu was arrested on August 23, 1944, sentenced to death by a People's Court, and executed on June 1, 1946. Iuliu Maniu was arrested on November 11, 1947 and condemned to imprisonment for life; he died in prison on January 3, 1953. Lucrețiu Pătrășcanu was arrested in February 1948 under the charge of "nationalistic-chauvinistic politics" and in 1954 was sentenced to death and executed for being an American spy; in 1968 he was rehabilitated and buried with pomp as a "communist hero" at the mausoleum in Bucharest, near Gheorghe Gheorghiu Dej (another "communist hero"), who gave the written order to conduct the inquiry against Pătrășcanu in such a way, that he could be declared guilty.

secondary-school in Paris) was brought to Bucharest under the pretext that Ana Pauker wanted to be acquainted with her. After Stoilow's whole family was in Rumania he was tacitly pushed aside, although not officially dismissed. No member of the family received permission to return to France. The belongings of the family in Paris had to be shipped to Bucharest by a friend. It was not until 1954 or 1955 that he happened to read in the newspapers that he was no longer Minister for France. Inquired by friends in Bucharest about his diplomatic experience in Paris he usually answered: "Questions were asked of me, which I could not answer (for obvious reasons)."

LIST OF SCIENTIFIC PAPERS AND MONOGRAPHS OF SIMION STOILOW

1. Sur les intégrales des équations linéaires aux dérivées partielles à deux variables indépendantes. C.R. Acad. Sci. Paris, 159 (1914), 231-234.
 2. Sur les fonctions quadruplement périodiques. C.R. Acad. Sci. Paris, 160 (1915), 129-134.
 3. Sur l'intégration des équations linéaires par les équations d'approximations successives. C.R. Acad. Sci. Paris, 162 (1916), 217-219.
 4. Sur une classe de fonctions de deux variables définies par des équations linéaires aux dérivées partielles (Thèse). Gauthier-Villars, Paris, (1916).
 5. Sur les singularités mobiles des intégrales des équations linéaires aux dérivées partielles et sur leur intégrale générale. Ann. Scient. Ecole Norm. Sup., 36, 3, (1919), 235-262.
 6. Sur la représentation analytique des fonctions de plusieurs variables complexes. C.R. Acad. Sci. Paris, 169 (1919), 610-612.
 7. Sur une classification des ensembles de mesure nulle. C.R. Acad. Sci. Paris, 169 (1919), 766-768.
 8. Sur la notion d'ordre d'un ensemble de mesure nulle. Comptes Rendus du Congrès International des Mathématiciens, Strasbourg, (1920), 160-163.
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10. Sur l'intégrale définie et la mesure des ensembles. C.R. Acad. Sci. Paris, 174 (1922), 802-804.
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15. Remarques sur quelques propriétés des transformations continues de n variables. C.R. Acad. Sci. Paris, 183 (1926), 731-732.
16. Les transformations continues et le théorème de M. Picard sur les fonctions entières. C.R. Acad. Sci. Paris, 185 (1927), 173-175.
17. Sur une classe de transformations continues à variation bornée. C.R. Acad. Sci. Paris, 186 (1928), 612-623.
18. Sur les transformations continues et la topologie des fonctions analytiques. Ann. Scient. Ecole Norm. Sup. Paris, (3), 45 (1928), 347-382.
19. Sur la topologie des fonctions analytiques. Atti del Congresso internazionale dei matematici, Bologna, 3 (1928), 231-233.
20. Sur les valeurs singulières des transformations continues de plusieurs variables. Mathematica, (Cluj), 2 (1929), 94-101.
21. Sur la continuité et la dérivabilité des fonctions. Bul. Fac. Ştiinţ., Cernăuţi, 3 (1929), 59-62.
22. Sur un théorème topologique. Fund. Math., Warszawa, 13 (1929), 186-194.
23. Du caractère topologique d'un théorème sur les fonctions méromorphes. C.R. Acad. Sci. Paris, 190 (1930), 251-253.
24. Sur l'inversion des transformations continues de deux variables. C.R. Acad. Sci. Paris, 192 (1931), 1342-1344.
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 35. Remarques sur les fonctions analytiques continues dans un domaine où elles admettent un ensemble parfait discontinu de singularités. *Bull. Math. Soc. Roumaine Sci.*, 38 (1936), 117-120.
 36. Sur l'extension d'une homéomorphie entre ensembles fermés. *Rev. Math. Union Interbalcanique*, 1 (1937), 97-100.
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