Friedrich Moritz Hartogs (1874 – 1943)

[This is a slightly augmented translation of the biography at the online site

http://www.b.shuttle.de/b/pns/faecher/mathematik/Verfolgte/FHartogs.html

and one reason for posting it is that the MacTutor site does not contain a biography for Hartogs. The biography is one of a series at the site on mathematicians who were persecuted during the Third Reich (***Verfolgte Mathematiker***).]

Biography

Friedrich (Fritz) Moritz Hartogs was born on 20 May 1874 in Brussels, Belgium, the son of a German – Jewish merchant family. He spent his youth in Frankfurt (am Main), where he attended the Realgymnasium Wöhlerschule, and in the spring of 1892 he graduated and received his diploma. As was usual at that time, he transferred universities several times for his subsequent studies, mainly in mathematics. At first he spent one semester each at the Technical Colleges of Hanover and Berlin, then at the Universities of Berlin and Munich. In Berlin his teachers included F. G. Frobenius (1849 – 1917), L. Fuchs (1833 – 1902), H. A. Schwarz (1843 – 1921) and M. Planck (1858 – 1947), and in Munich they included F. Lindemann (1852 – 1939) and A. Pringsheim (1850 – 1941). Also in 1900, during his time in Berlin, he was married in Hamburg.

In Munich he ultimately wrote his doctoral thesis with with Pringsheim titled "Beiträge zur elementaren Theorie der Potenzreihen und der eindeutigen analytischen Funktionen zweier Veränderlichen [Contributions to the elementary theory of power series and single valued analytic functions of two variables]," and he was awarded a doctorate in 1903. Only two years later he received his Habilitation [a European level of recognition generally awarded several years after a doctorate and requiring substantial additional achievements] with the paper, "Zur Theorie der analytischen Funktionen mehrerer unabhängiger Veränderlichen, insbesondere über die Darstellung derselben durch Reihen, welche nach Potenzen einer Veränderlichen fortschreiten

[On the theory of analytic functions of several independent variables, in particular on their representation by series, which continue according to powers of one variable]" and became a ***Privatdozent*** [junior faculty member].. One of the students who had Hartogs as a teacher during the academic year 1909 – 1910 was A. Fraenkel, who wrote in his memoirs that Hartogs was by nature consistently shy and in fact anxious, a characterization later confirmed by A. Weil (1906 – 1998), who visited Hartogs in 1927. Hartogs was *"mainly a quiet working excellent mathematician."* His mathematical ideas far surpassed those of his teacher Pringsheim and pointed to the bright future that the theory of functions of several complex variables was destined to enjoy. In many theories he was the first to show things; *e.g.*, that *"the theory of the functions of several complex variables has surprising properties."*

In the year 1910 Hartogs was given the title and rank of a nonregular professor, and this was confirmed by actions taken in 1913. A decade later, in 1922 Hartogs was offered a chair at the University of Frankfurt as the successor of A. Schoenflies (1853 – 1928), but he surprisingly rejected offer (after which the chair was given to the eminent number theorist C. L. Siegel (1896 – 1981). The University of Frankfurt had just been created in 1914 as a privately funded institution, and the trust assets supporting the funding were threatened by the hyperinflation of the time. A letter from Hartogs to the Munich faculty, in which he explains justifies his refusal of the offer, includes the following remarks:

> ***...*** *[since] the professors of the University of Frankfurt legally have no claims on the state, but only have claims on the University of Frankfurt,* ***...*** *it seemed to me that under the current uncertain internal and foreign policy relationships, which threaten to worsen daily, this decision was by no means worry – free, and as a head of household* [*the Hartogs couple had four children*], *I would feel guilty if I were to let the great advantages of by the position offered in Frankfurt blind me to the issue of material safeguards affecting my family* ***...***

Thus Hartogs remained a nonregular Professor in Munich, but in 1927, upon the request of its colleagues O. Perron (1880 – 1975), C. Carathéodory (1873 – 1950) and A. Tietze (1880 – 1964), he received a regular professorship.

After the seizure of power by the Nazis in the year 1933 the law was issued for the re-establishment of the civil service with tenure, after which "non – Ayans" were to be removed from the service. At first Hartogs was still able to remain at the university due to a special dispensation because he had been a civil servant since 1914. A brief attempt of some overeager student militants to remove Hartogs from the university failed because Reichsminister Hess and the Bavarian Secretary of Cultural Affairs Schemm argued for the retention of Hartogs.

The Nazi era

However, in 1935, when Nuremberg decree became law, Hartogs was first relieved of duties on 22 October, and then at the end of the year he was obliged to leave as a retired civil servant. At first he still had occasional contact with the University and Technical College and received visits from some colleagues. However, due to spying by the other residents of the house (the ground floor was rented) and the neighborhood block-watch, his isolation became increasingly stronger. In 1939 Hartogs was also expelled from the Deutsche Mathematiker – Vereinigung [The German Mathematical Society]. On 10 November 1938 (after the infamous ***Kristallnacht***) Hartogs was taken to the Dachau concentration camp for several weeks.

Although he had already signed over his house in Grosshesselohe to his wife (an "Aryan") in 1933, this ownership was considered as having Jewish ties and was threatened by seizure, which would have been followed by sentencing to a labor camp and later deportation. In order to avert seizure, Hartogs' wife decided in 1941 on the prodding of their attorney – and with the consent of her husband – to submit a divorce petition for which legal wrangling could stretch out the procedure for as long a time as possible; the divorce did not take effect until the beginning of 1943. With the silent tolerance of the local group leader of Pullach, Hartogs was allowed to continue living in his house, but he still could not bear “the chain of continual humiliation any longer” (Roland Bulisch). On 18 August 1943 Friedrich Hartogs ended his life with an overdose of barbiturates.

Mathematical achievements

Hartogs’ most profound and celebrated mathematical contributions were his results on the representation of analytic functions of several variables by means of power series. Thus his Habilitationsschrift [the main written work required for habilitation] contains a proof of the Hartogs Main Theorem, also known as the ***Hartogs Continuity Theorem*.** One special case, the ***Hartogs Ball Theorem*,** says that each holomorphic function on an annular region of complex dimension greater than 1 (in particular, every open disk with its center removed) can be extended to the disk containing that annulus. Likewise, his name lives on in the ***Hartogs figure*,** which represents the simplest example of a region which is not a domain of holomorphy, and in ***Hartogs domains*** (convergence ranges for certain series). He further proved the important fact that a function of several complex variables is holomorphic if it is holomorphic in each variable separately; this result is particularly striking because the corresponding statement for real variables is totally false. Through his contributions to several complex variables, Hartogs became the founding father of the theory of complex analysis in several variables. In addition to his work on several complex variables, he proved that the function

$$\mathbf{u(x, y) = \log R(z), \qquad z = x + i\, y}$$

is subharmonic, although he did not use this word. This was the first occurrence of subharmonic functions in analysis. He is also known for a result in set theory on the existence of an upper bound on the ordinal numbers that can be used to well – order a set.

Sources

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Web site for the Mathematical Institute of the University of Munich:

http://www.mathe.lmu.de