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(*b*. Lvov, Galicia, Austria-Hungary [now Ukrainian SSR1], 21 September 1899; *d*. Lvov, September 1943)

mathematics.

The son of Samuel Schauder, a Jewish lawyer, Schauder was educated in the Austro-Hungarian school system. In 1917 he was drafted into the Austro-Hungarian army, fought in Italy, and was taken prisoner. He joined the new Polish army in France and after his return to Lvov started his studies at the Jan Kazimierz University.

His university studies brought him into contact with the Polish mathematical school, of which he was to become an integral part. Zygmunt Jani-szewski, who had studied in Paris under Henri Poincaré Henri Lebesgue, and M. Fréchet, played a decisive role in the formation of this school. Schauder received his Ph.D. in 1923 and then worked in insurance and as a secondary-school teacher in Przemyslany. In 1927 he received his *venia legennli* which entitled him to give courses at the university. In 1928 and 1929 he gave his first course on partial differential equations. He then became an assistant lecturer at the university, and for a time held two jobs, one as an assistant lecturer and one as a teacher in a secondary school. In 1929 he married Emilia Löwenthal, whose grandfather had been expelled from his small Jewish community for being an atheist.

L. E. J. Brouwer published his famous fixed point theorem for finite dimensional spaces in 1911. A fixed point x^* is a point that does not change under a transformation T, that is, for a fixed point we have $T(x^*) = x^*$. Schauder published his fixed point theorem for infinite dimensional spaces (Banach spaces) in 1930, using compactness arguments in the proof. For 1932 and 1933 he was awarded a Rockefeller Fellowship. He spent September 1932 to May 1933 with L. Lichtenstein in Leipzig and the remaining time to September 1933 with Jacques Hadamard in Paris.

With J. Leray he published a paper (1934) considered to be a landmark in topological thinking in connection with partial differential equations. In this paper what is now known as Leray-Schauder degree (a homotopy invariant) is defined. This degree is then used in an ingenious method to prove the existence of solutions to complicated partial differential equations. First the existence of solutions to a simple partial differential equation is proved and then, by deforming this simple partial differential equation in a suitable function space, the existence of solutions to the complicated partial differential equation can be established. Schauder attended conferences at Geneva and Moscow in 1935 and at Oslo in 1936. At about the same time he tried to get an invitation to Princeton University.

Schauder's last paper was published in 1937. It includes a correction to his 1930 fixed point paper and thus completes the proof of his fixed point theorem. After 1934 his papers are mainly concerned with refining his techniques, for instance, by giving detailed estimates for the norm of the solution function for elliptic partial differential equations. In the context of hyperbolic partial differential equations. R. Courant, K. Friedrichs, and H. Lewy had investigated the connection between the original partial differential equation and discrete approximations suitable for numerical solution. Schauder generalized their approach and used inequalities of the Sobolev type to obtain estimates for hyperbolic partial differential equations. In 1938 he and Leray were awarded the Prix Internationaux de Mathematiques Malaxa.

In 1939 the Red Army entered Lvov. Schauder was made a professor at the university and became a member of the Ukrainian Academy of Sciences. This lasted until the Germans occupied Lvov in June 1941 and began the systematic extermination of Jews. A last desperate plea for help, delivered by a Polish student who escaped to Switzerland, reached the topologist Heinz Hopf. Among other things, Schauder wrote that he had many important new results but no paper to write them on. He implored the Swiss mathematicians to ask the German physicist Werner Heisenberg to intervene with the German authorities so that his life would be spared. The Swiss physicist W. Scherrer wrote a letter to Heisenberg, but to no avail. Schauder died in September 1943. According to one version he was betrayed to the Gestapo, was arrested, and disappeared; according to another (more probable) version he was shot after one of the regular roundups. His wife, Emilia, and his daughter, Eva, were hidden by the Polish underground and lived for a while in the sewers of Warsaw. Eva survived the war in a Catholic nunnery. Emilia surrendered to the police and perished in Majdanek (Lublin) concentration camp. After the war Eva went to live with her father's brother in Italy and became an English teacher.

Schauder's fixed point theorem and his skillful use of function space techniques to analyze elliptic and hyperbolic partial differential equations are contributions of lasting quality. Existence proofs for complicated nonlinear problems using his fixed point theorem have become standard. The topological method developed in the 1934 Leray-Schauder paper, known as the continuation or homotopy method, is now utilized not only to obtain qualitative results but also to solve problems numerically on computers.

BIBLIOGRAPHY

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Walter Forster