Pergamon
www.elsevier.com/locate/jappmathmech
PII: S0021-8928(99)00022-2
J. Appl. Maths Mechs, Vol. 63, No. 2, pp. 149–160, 1999

0021-8928/99/$—see front matter

PELAGEYA YAKOVLEVNA KOCHINA— ON HER HUNDREDTH BIRTHDAY†

May 1999 marked the hundredth birthday of the remarkable Russian woman and eminent scientist—Academician Pelageya Yakovlevna Polubarinova-Kochina. She was born on 13 May 1899 into the family of an educated worker on a farmstead in the steppes to the north of the Caspian Sea. Her father, who was an accountant, moved from Astrakhan to Petersburg so that his children could receive higher education. In spite of all the difficulties of the war and immediate post-war years, his eldest daughter Pelageya graduated from Pokrovskaya Girls' Gymnasium and was admitted to Bestuzhevsky Women's Higher Courses (VZhK). She graduated from Petrograd University after the revolution. The family was not well-off—Pelageya Yakovlevna's father died in 1918, and she had to earn her own living while still a youngster, first by giving lessons and working as a librarian at the VZhK and then as a calculation officer the Main Geophysical Observatory. It was there that her scientific career began, and that she met her future husband Nikolai Yevgrafovich Kochin (1904–1944)—who was to become an academician and one of the greatest Russian scientists in the area of mechanics and meteorology during the first half of the 20th century.

During the 1920s Kochina developed fully in both character and range of interests. She was well prepared for her long years of scientific and community-based work. While the great array of eminent university professors inspired her love of science and independent research, the traditions of the Bestuzhevskaya girl students made her a persistent fighter for women's rights. It was as if her path towards research in the history of science, historico-scientific research, was sanctified by the bust of Sophia Kovalevskaya in the reading room of the VZhK.

The lectures by V. I. Smirnov and G. V. Kolosov which she attended influenced her in her decision to use the methods of the theory of functions of a complex variable in her research. Subsequent conversations with Nikolai Yevgrafovich ("over a cup of tea", as she recalls) encouraged her to apply the analytic theory of differential equations with regular singular points in fluid dynamics. Kochina's work with A. A. Fridman at the Main Geophysical Observatory and the contact she had with leading

†*Prikl. Mat. Mekh.* Vol. 63, No. 2, pp. 163–167, 1999.

scientists in various fields were largely responsible for her wide interest in the general problems of physics and mathematics.

She started teaching in Leningrad—first at a workers' preparatory school and then in various technical colleges. Her initial research in geophysical fluid dynamics progressed only in fits and starts, because most of her time was occupied with teaching, looking after her young family, and acting as a deputy to the Leningrad Soviet.

In 1934 when the Academy of Sciences was transferred from Leningrad, the Kochins moved to Moscow, and she began working in the Department of Mechanics of the Mathematica Institute, of which Kochin was the director. As soon as it was established by the Academy of Sciences in 1938 the Kochins moved to the Institute of Mechanics.

At the end of the 1930s, she turned to the research area that was to become identified with her—subterranean fluid dynamics. She defended her doctoral dissertation on the subject in 1937 and published her first brilliant papers on the theory of the steady free flow of groundwater between 1938 and 1941. These were republished in the monograph *Some Problems of the Plane Flow of Ground Water* (1942), which was awarded the Stalin Prize in 1946. Kochina went on to study the unsteady free flow of groundwater. In particular, she obtained a discontinuous solution of the problem of unsteady free flow through a porous medium (in the case where it could be reduced to a non-linear diffusion equation) for a finite velocity of the front. These results generated a great deal of research and were applied in various areas of fluid dynamics. She also worked on the subterranean fluid dynamics of oil (the contraction of the oil-bearing contour). In 1952 she published her important monograph *Theory of Ground Water Flow* (2nd edition, 1977), which was to become the reference book of experts and was translated in to English and Chinese. The publication of these two books made her famous and marked her as a world expert in this area. Earlier Soviet achievements of that school are described in detail in *The Development of Research on the Theory of Flow Through a Porous Medium in the USSR (1917–1967)* (1969). She continued her research without interruption. Her first contribution to this journal was in 1936 and her latest is printed in this issue.

For the last 65 years she has been associated with the Academy of Sciences of the USSR (now the Russian Academy of Sciences). She directed the Department of Fluid Dynamics at the Institute of Mechanics up to 1958. She was elected a corresponding member of the Academy in 1946 and was elected academician at the first elections in the Siberian Department of the Academy in 1958. She then moved with a group of pioneering academics to Novosibirsk to establish the Siberian Section of the Academy. For more than ten years she directed the Department of Applied Fluid Dynamics at the Institute of Fluid Dynamics, established by M. A. Lavrent'yev at the Akademgorodok which had grown up near Novosibirsk. In 1970 Kochina returned to Moscow as Head of Department at the Institute of Problems of Mechanics of the Academy of Sciences. For a number of years she presided over the All-Union Seminar on the theory of flow through a porous medium. She combined research with teaching, offering special courses as Professor of Subterranean Fluid Dynamics at both Moscow University and Novosibirsk University.

Kochina's research work was always matched by her interest in practical engineering. This is illustrated by her first studies of the dynamics of ground water, which included an investigation of the flow through a porous medium in hydrotechnical equipment, and the interaction between fresh ground water and high-mineral subterranean water in flow through salinized regions and near seacoasts. But she was particularly interested in real-life problems, as can be seen from her work in Siberia. Not only did she establish a group of young experts on seepage theory at the Institute of Hydrodynamics, but she also became interested in a major regional problem which involved issues of hydrology, hydro-geology, land reclamation and water management—the irrigation of the Kulundinskaya Steppe. A special research council had been set up to consider this problem in the Siberian Section of the Academy of Sciences. As director of the project, she invited the participation of specialists of all kinds, from experts in land reclamation to soil scientists, hydrotechnical engineers and mathematicians. She herself took part in several expeditions to the Kulundinskaya Steppe. She was especially interested in the possibility of using ground water to irrigate agricultural land. Practical experiments were carried out in some cases.

A large part of her research concerned the history of science and, in particular, the life and work of another eminent woman scientist, Sophia Vasil'yevna Kovalevskaya. She edited a collection of Kovalevskaya's research papers (1948). She published her studies of the life and work of Kovalevskaya and also of Kovalevskaya's teacher Karl Weierstrass and Swedish colleague and friend Mittag-Koeffler. She also edited a thoroughly annotated correspondence between Kovalevskaya and various eminent mathematicians of the 19th century. Her work in this area has made an enormous contribution to the history of science, underlining the unity of world science and the close relations between the national cultures of different countries.

Throughout her whole life, she has participated in community work. She was elected to the City Soviets of Leningrad and Moscow, and to the Supreme Soviet of the Russian Federation. She took an active part in the work of the Anti-Fascist Committee of Soviet Women (later the Committee of Soviet Women). In this capacity she made several trips within the USSR and abroad.

In *Recollections* (1974), later reprinted with additions in *Science. People. Years* (1988), and in a book about her husband: *Nikolai Yevgrafovich Kochin* (1979; 2nd edition 1993), she has given a detailed description of her life and her impressions of meetings with many interesting people. Her published memoirs show her to be a subtle observer as well as a talented writer and no mean artist.

She is a great optimist and enthusiast, as seen from the two books on popular science and that she wrote for young people: *Underground Waters* (1964) and *The World of Underground Fluids* (1994).

She was awarded the highest state honours of the USSR, including Hero of Socialist Labour. She is a permanent member of the Editorial Board of *Applied Mathematics and Mechanics* and *Fluid Mechanics*, and is on several scientific councils and commissions.

She is always modest and charming in her relations with friends, colleagues and students, leaving a lasting impression on all who meet her.

The editorial board, editors, authors and readers of this journal offer Pelageya Yakovlevna Kochina sincere congratulations on her birthday, and wish her continuing success in scientific and community work.

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1929

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Translated by R.L.