

100th Anniversary from the birth of Academician Samson Semenovich KUTATELADZE



July 18, 2014, was the 100th anniversary of the famous scientist, Academician Samson Semenovich Kutateladze (1914-1986). The history of thermophysics is inseparably linked with the name of S. S. Kutateladze, who made a priceless contribution to development of science on heat and mass transfer.

Scientific activity of S. S. Kutateladze started at the Polzunov Scientific and Development Association of Research and Design of Power Engineering (NPO CKTI) in 1932 when he performed the first integrated modelling of a thermal mode of underground pipelines, and then in 1955 he suggested the model of free-convective flows, which received the experimental foundations only at the end of the 1960s.

His works on heat and mass transfer at phase transitions brought a wide recognition to this young scientist. In 1936 he was first to formulate the conditions of thermodynamic similarity of the processes at phase transitions and introduce the corresponding similarity criterion now known as the Kutateladze criterion. Experimental studies of heat transfer at condensation, boiling, solidification, and bubbling, together with a new method of experimental data generalization are presented in his monograph *Fundamentals of the Heat Transfer Theory at Transition of Aggregate States of Substance* (1939), which became the first monograph in the world on this subject.

The World War II interrupted the scientific career of S.S. Kutateladze. Since January 1941 till August 1945 Samson Kutateladze was in the Soviet Army at the North Front. He actively participated in battles and was wounded.

Since 1946 S. S. Kutateladze started the systematic investigation of liquid-metal heat-carriers used for nuclear plants. This cycle of research made him the coauthor of the first Russian monograph on liquid-metal heat-carriers. This work was published in 1958 and reissued repeatedly in the years to come.

His relentless studies on thermodynamics of gas-liquid systems brought to S. S. Kutateladze the fundamental results in 1949, which led to development of hydrodynamic theory of boiling crises. Working on the fundamentals of hydrodynamic stability of the flow regimes of gas-liquid mixtures in 1958 S. S. Kutateladze, together with Academician M. A. Styrikovich, wrote the monograph *Hydrodynamics of Gas-Liquid Systems*, which generalized the research data of that time.

After his graduation from the Leningrad Correspondence Industrial Institute in 1950, S. S. Kutateladze held a Ph. D. thesis so that he obtained his Doctor's degree in 1952, and in 1954 he became a Professor.

In the late 50s, S. S. Kutateladze concentrated on the near-wall turbulence research. This period started from his removal to the Siberian Branch of the Academy of Sciences of the USSR. Among the theories of the turbulent boundary layer, the asymptotic theory developed by S. S. Kutateladze differed from the others by a new approach to the problem. His discovery of the finiteness of the relative friction coefficient at unlimited increase in Reynolds number found fruitful continuation in development of calculation methods for turbulent boundary layers under the complex boundary conditions. His two monographs, written together with A. I. Leontiev, deal with these problems.

After taking the position of the director at the Institute of Thermophysics SB AS USSR in 1964, S. S. Kutateladze demonstrated his outstanding talent of management in science. The activity of S. S. Kutateladze at the Institute determined the study on dynamics of rarefied gas, radiant-conductive heat transfer, and application research aimed at designing new power installations.

In 1968 S. S. Kutateladze was elected the corresponding member and he became the full member of the Academy of Sciences of the USSR in 1979. More than 60 of his disciples and collaborators held Ph. D. thesis, more than 30 became Doctors of Sciences, and now some of them are members of the Academy of Sciences: A. I. Leontiev, V. E. Nakoryakov, A. K. Rebrov, and E. P. Volchkov.

Since the end of 70s, the scientific activity of S. S. Kutateladze was characterized by creation of large generalizing works and monographs *Fundamentals of Heat Transfer* (reissued 5 times), *Similarity Analysis in Thermophysics* (1982) and *Similarity Analysis and Physical Models* (1986) are of particular importance. The results of Kutateladze's scientific school activity in the field of thermal hydrodynamics of the two-phase flows were presented in the wellknown monograph *Heat and Mass Transfer and Waves in Gas-Liquid Media* (1984) written together with V. E. Nakoryakov. Although he was already ill, S. S. Kutateladze continued working on his handbook *Heat Transfer and Hydrodynamic Friction*. In total, S. S. Kutateladze wrote 20 monographs and almost 300 papers.

S. S. Kutateladze is the founder of one of a leading scientific schools on thermophysics and hydrodynamics. His ability to combine scientific and lecturing activities was perfect, as in 1962 he became a Professor, and then he became the head of Thermophysics Chair at the Novosibirsk State University.

Great scientific achievements of S. S. Kutateladze were awarded by numerous government rewards; he was honored by the title of the Hero of Socialist Labor; the State Prizes of the USSR and the Russian Federation, Polzunov Prize of AS USSR, and International Medal of M. Jakob was awarded to him as well. The Institute of Thermophysics SB RAS was named after S. S. Kutateladze in 1994.

Besides intensive research activity, S. S. Kutateladze paid great attention to the international scientific co-operation. He founded and organized 1st Siberian International Thermophysical Symposium in 1969, and actively has been involved in organization of the International Center for Heat and Mass Transfer, founded and located in Vinca Institute of Nuclear Sciences in Belgrade (former Yugoslavia). Center was supported by many reputed scientists in heat and mass transfer, from West and East, and organized large number of Symposia in Dubrovnik, Croatia (former Yugoslavia). At the beginning of 90-ties International Center moved to Ankara, Turkey.

Acad. S. S. Kutateladze, supported scientific co-operation between Institute of Thermophysics and Vinca Institute, and greatly contributed to the improvement and development of the theoretical and experimental research activity in heat and mass sciences in the Laboratory for Thermal Engineering and Energy at Vinca Institute, in Serbia, and former Yugoslavia, in general.

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