



PROF. A. A. GUKHMAN

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H.M.

TO A. A. GUKHMAN ON HIS 70th BIRTHDAY

ON 5 FEBRUARY 1967 was the seventieth anniversary of the birth and the forty-fifth anniversary of the scientific and teaching activities of one of the most prominent Soviet scientists, Doctor of Physico-mathematical Sciences, Professor, Head of a Department in the Moscow Institute of Chemical Engineering, Alexander Adolfovich Gukhman. He is a scientist with an unusually wide range of interests coupled with a great depth of penetration into the essence of the studied problem, striving for the explanation of the physical mechanism of the phenomenon and for revealing the logical structure of the theories available and being developed.

In a brief review it is impossible to show the contribution of such a prominent scientist to science and to describe even the most important research works carried out by Alexander Adolfovich, for he published 79 papers and wrote 5 scientific monographs.

In his theoretical studies great attention is paid to the analysis of the logical structure of thermodynamics. These investigations gave an original system of thermodynamic construction which is well-composed and notable for its completeness. For the first time in science this system was developed in a complete form in our country and published in the book "Foundations of Thermodynamics" in 1947.

Especially widely known in the U.S.S.R. and abroad are Gukhman's works dedicated to the similarity theory, the present form of which is indebted to him to a considerable degree. In his first book "Physical Fundamentals of Heat Transfer" published in 1934 he gave a systematic interpretation to the fundamentals of the similarity theory and its application to heat-transfer problems. This book aroused great interest among thermal engineers and still has not lost its importance now. In 1963

was published the monograph "Introduction into the Similarity Theory" which, crowned Alexander Adolfovich's many years of work on the development of a complete similarity theory as a study on generalized variables typical for any given process. The book reveals the depth of the internal logical bonds of the method and the apparatus of the similarity theory.

Of the thermo-physical studies of Alexander Adolfovich, his most famous are those on the problem of heat transfer and hydrodynamic resistance in a gas flow with high velocity. Thirty years had been dedicated to these investigations, during which time, together with his pupils, he obtained a number of most important results. Let us mention only the derivation of a generalized form of the hydrodynamic heat-transfer theory and the entropy method of hydrodynamic resistance calculation in the transonic region, and the study of the effect of turbulence degeneration in the transition through the velocity of sound.

In the last ten years Gukhman has been deeply interested in the problem of sublimation in vacuum and his ideas on the physical mechanism of sublimation and the effect of the process itself on the heat- and mass-transfer rate achieved recognition in a wide circle of specialists. At least two distinguishing features are most typical of Alexander Adolfovich's works. First of all it is clearly seen that his works are produced not only as a reply to the questions raised by the engineering practice of today but also as a result of insight into the ways of the development of technical ideas. The other feature, perhaps the most typical one, is the striving for comprehensive generalizations and construction of serious scientific analogies and abstractions.

Gukhman's research work is closely interwoven with his teaching activity. After graduating from the Petrograd Polytechnical Institute in 1921 he has been working continuously at the High School. He rightly earned the reputation as a brilliant lecturer who can interpret the most complicated theoretical problems in a clear, profound and consistent manner. This is equally true of both the lectures for the students and the extramural courses for scientific workers and engineers regularly delivered by him. The originality of the material, high theoretical level of the lectures, their extremely rational construction and excellent style constantly attract broad circles of engineers and scientific workers to his lectures.

The scientific ideas developed by Gukhman are being developed by his numerous pupils, some grouping directly around him and some developing his ideas in various scientific institutions of the Soviet Union.

His talent for organization promoted him as a creator and leader of research organizations and laboratories. He is one of the founders of the Polzunov Central Scientific-Research Turbine-Boiler Institute where for a long time he has guided physico-technical research works, and is still closely connected with the Institute. He took part in organizing the Institutes of Astronomy and Physics, for he was also one of the organizers and the scientific director of the Institute of Energetics of the KazSSR Academy of Sciences.

The versatility of his knowledge, his profound ideas, the wide scope of his intellectual interests and personal charm earned him a well merited prestige among the students and scientific workers.

In the days of his anniversary Alexander Adolfovich is full of creative projects and energy infecting all those working around him with enthusiasm.

We wish Alexander Adolfovich Gukhman the fulfilment of all his extensive creative projects.

REFERENCES

1. A. A. GUKHMAN, On the charge factor of four-cycle engines, *Azerb. Neft. Khoz.* (1923).
2. A. A. GUKHMAN, To the temperature dependence of indicator efficiency, *Azerb. Neft. Khoz.* (1923).
3. A. A. GUKHMAN, *Rail Cars*, Collected papers. Uspek. Tepl. Tekhn. (1924).
4. A. A. GUKHMAN, Temperature distribution in the walls of internal combustion engine cylinders, Collected papers, *Uspek. Sovrem. Dizelstr.* (1924).
5. A. A. GUKHMAN, On a graphical method of heat amount definition, *Izv. Leningr. Politekh. Inst.* 29 (1925).
6. A. A. GUKHMAN, To the theory of heat transfer in a free gas flow, *Trudy Leningr. Fiz.-Tekh. Inst.* v. 6 (1926).
7. A. A. GUKHMAN and M. V. KIRPICHEV, On heat transfer of a vertical tube in a free air flow, *Trudy Leningr. Fiz.-Tekh. Inst.* v. 6 (1926).
8. A. A. GUKHMAN and M. V. KIRPICHEV, Theory of models, *Izv. Leningr. Politekh. Inst.* 30 (1927).
9. A. A. GUKHMAN, Steam boilers, Course of lectures, Narodny Universitet na Domu, Leningrad (1927).
10. A. A. GUKHMAN, The law of mechanical similarity in application to the study of a gas flow with the help of models, in *Proceedings of the 3rd All-Union Thermal Meeting* (1924).
11. A. A. GUKHMAN, On heat transfer, in *Proceedings of the 3rd All-Union Thermal Meeting* (1924).
12. A. A. GUKHMAN, Approximate thermal similarity for the case of a flue with variable cross-section, *Izv Leningr. Politekh. Inst.* v. 32 (1929).
13. A. A. GUKHMAN and M. V. KIRPICHEV, Similarity theory, *Trudy Gos. Fiz. Tekh. Lab.* v. 9 (1929).
14. A. A. GUKHMAN, *Heat Transfer*, Lectures delivered at trade-improvement courses for thermal engineers, Leningrad (1924).
15. A. A. GUKHMAN and M. V. KIRPICHEV, Heat transfer of pipes in a free air flow, *Trudy Gos. Fiz. Tekh. Lab.* v. 9 (1929).
16. A. A. GUKHMAN and M. V. KIRPICHEV, Applications of the similarity theory, *Trudy Obl. Leningr. Teplotekh. Inst.* v. 1 (1931).
17. A. A. GUKHMAN and N. V. MIKHEEVA, Similarity of unsteady thermal solid states, *Trudy Obl. Leningr. Teplotekh. Inst.* v. 1 (1931).
18. A. A. GUKHMAN, Radiant heat transfer between two parallel plates, *Zh. Tekh. Fiz.* 1, v. 5 (1931).
19. A. A. GUKHMAN, To the theory of resonance in pipelines of piston engines and compressors, *Dizelestr.* 5 (4) (1931).
20. A. A. GUKHMAN and A. S. SINELNIKOV, Similarity of solid cooling processes in a forced gas flow, *Zh. Tekh. Fiz.* 2, v. 6 (1932).
21. A. A. GUKHMAN, Scientific-research work in physico-thermal engineering, *Zh. Tekh. Fiz.* 2, v. 1 (1933).
22. A. A. GUKHMAN, V. S. ZHUKOVSKY and V. N. TARASOVA, To the similarity boundaries in gas-dynamic phenomena, in *Proceedings of VITGEO to the 17th Party Congress* (1934).
23. A. A. GUKHMAN, Similarity theory, *Technical Encyclopaedia*, Vol. 22 (1934).
24. A. A. GUKHMAN, Extension of the screen method to the case of two surfaces one of which is enveloping the other, *Zh. Tekh. Fiz.* 4, v. 4 (1934).

25. A. A. GUKHMAN and L. G. LOYTSYANSKIY, Turbulent flow, *Technical Encyclopaedia*, Vol. 24 (1934).
26. A. A. GUKHMAN and N. V. MIKHEEVA, Similarity of unsteady thermal states of a solid, Paper 2, *Trudy VITGEO* No. 8 (1934).
27. A. A. GUKHMAN and N. V. MIKHEEVA, Similarity of unsteady thermal states of a solid, Paper 3, *Trudy VITGEO* No. 8 (1934).
28. A. A. GUKHMAN, L. G. LOYTSYANSKIY and V. S. ZHUKOVSKIY, Sur quelques methodes de la reduction de la resistance hydrodynamique et de l'intensification de la transmission de la chaleur, *Tech. Phys. U.S.S.R.* 1 (1934).
29. A. A. GUKHMAN, Mechanism of relations between hydrodynamic resistance and heat transfer, in *Proceedings of the 3rd Aerodynamic Conference held in 1932*, Collected papers (1934).
30. A. A. GUKHMAN, *Physical Fundamentals of Heat Transfer* Energoizdat (1934).
31. A. A. GUKHMAN, Fundamentals of the similarity theory, *Sorena* No. 5 (1934).
32. A. A. GUKHMAN, Similarity theory as a basis of the model method, *Sorena* No. 6 (1934).
33. A. A. GUKHMAN, N. V. ILYUKHIN, V. N. TARASOVA and VARSHAVSKIY, Study of heat transfer in a gas flow along a straight duct at rather a high velocity, *Zh. Tekh. Fiz.* 5, vyp. 10 (1935).
34. A. A. GUKHMAN, On heat transfer at high velocity, *Sov. Kotloturbostr.* No. 4 (1934).
35. A. A. GUKHMAN, To the similarity of temperature and velocity fields of a turbulent flow, *Zh. Tekh. Fiz.* 6, vyp. 5 (1936).
36. A. A. GUKHMAN, To the relation between resistance and heat transfer in a turbulent flow, *Zh. Tekh. Fiz.* 8, vyp. 9 (1938).
37. A. A. GUKHMAN, Methods of comparison of convective heating surfaces, *Zh. Tekh. Fiz.* 8, vyp. 17 (1938).
38. A. A. GUKHMAN, To the theory of limiting states of a moving gas, *Zh. Tekh. Fiz.* 9, vyp. 5 (1939).
39. A. A. GUKHMAN, Determination of the number of similarity criteria, *Uchen. Zap. Kazakh. Gos. Univ.* (1941).
40. A. A. GUKHMAN, The role of temperature in similarity theory equations, *Uchen. Zap. Kazakh. Gos. Univ.* (1941).
41. A. A. GUKHMAN, The study of gas movement along a tube at high velocity and heat transfer, *Zh. Tekh. Fiz.* 10, vyp. 20 (1940).
42. A. A. GUKHMAN, Extension of the similarity theory to the case of a medium with variable physical properties, *Izv. Kazakh. Fil. Akad. Nauk, Energ. Ser.* vyp. 1 (1945).
43. A. A. GUKHMAN, On crisis phenomena in gas movement, *Vest. Kazakh. Fil. Akad. Nauk* No. 7, 8 (1945).
44. A. A. GUKHMAN, To the theory of gas movement, *Sovetsk. Kotloturbostr.*, No. 1 (1947).
45. A. A. GUKHMAN, *On Fundamentals of Thermodynamics* Izd. Akad. Nauk Kazakh. SSR (1947).
46. A. A. GUKHMAN, Some problems of gas movement theory, *Izv. Kazakh. Fil. Akad. Nauk, Energ. Ser.* vyp. 2 (1948).
47. A. A. GUKHMAN and N. V. ILYUKHIN, Heat transfer in high velocity gas flow in tubes, *Trudy TsKTI*, 12, vyp. 3 (1949).
48. A. A. GUKHMAN, Some relations in the theory of nonadiabatic gas flows, *Trudy Mosk. Aviats. Tekhnol. Inst.* vyp. 8 (1950).
49. A. A. GUKHMAN and A. I. VEINIK, Analysis of conditions of thermal interaction between casting and mould, *Zh. Tekh. Fiz.* 21, vyp. 1 (1951).
50. A. A. GUKHMAN and A. I. VEINIK, Calculation methods of crystallization processes in casting, *Zh. Tekh. Fiz.* 21, vyp. 1 (1951).
51. A. A. GUKHMAN and N. V. ILYUKHIN, *Fundamentals of Heat Transfer Study in a High Velocity Gas Flow*. Mashgiz. (1951).
52. A. A. GUKHMAN, N. V. ILYUKHIN, A. F. GANDELSMAN and L. N. NAURITS, Experimental investigation of heat transfer and resistance in subsonic region, *Trudy TsKTI* 21, vyp. 5 (1954).
53. A. A. GUKHMAN, N. V. ILYUKHIN, A. F. GANDELSMAN and L. N. NAURITS, Experimental investigation of a thermocouple in a high velocity longitudinal flow, *Trudy TsKTI* 21, vyp. 5 (1954).
54. A. A. GUKHMAN, On G. N. KRUZHILIN's formula for vapour humidity versus loading, *Izv. Akad. Nauk SSSR, Otd. Tekh. Nauk* No. 2 (1952).
55. A. A. GUKHMAN and N. V. ILYUKHIN, Temperature factor influence on heat transfer rate, *Zh. Tekh. Fiz.* 22, vyp. 5 (1952).
56. A. A. GUKHMAN, Some problems of high rate convective heat transfer, *Zh. Tekh. Fiz.* 23, vyp. 6 (1953).
57. A. A. GUKHMAN and E. A. ERMAKOVA, On peculiarities of heat transfer in ice sublimation, *Zh. Tekh. Fiz.* 23, vyp. 8 (1953).
58. A. A. GUKHMAN, The influence of medium velocity on heat transfer rate at vapour generation, *Teplotoenergetika* No. 2 (1954).
59. A. A. GUKHMAN, On one argument of critical heat and mass transfer equations in evaporation and drying, *Teplotoenergetika* No. 5 (1954).
60. A. A. GUKHMAN, A. F. GANDELSMAN, N. V. ILYUKHIN and L. N. NAURITS, The study of resistance coefficient when gas flows at nearsonic velocity, I and II, *Zh. Tekh. Fiz.* 24, vyp. 12 (1954).
61. A. A. GUKHMAN, A. F. GANDELSMAN and N. V. ILYUKHIN, The study of resistance coefficient variation when gas flows at supersonic velocity, *Teplotoenergetika* No. 1 (1955).
62. A. A. GUKHMAN, Remarks on P. V. DVORNICHENKO's paper, *Zh. Tekh. Fiz.* 27, vyp. 5 (1957).
63. A. A. GUKHMAN, A. F. GANDELSMAN and L. N. NAURITS, On hydrodynamic resistance in transonic flow region, *Energomashinostroenie* No. 7 (1957).
64. A. A. GUKHMAN, Application of the similarity theory to the study of heat and mass transfer in drying, *Plenary Session of the All-Union Scientific-Engineering Drying Meeting*, 1956. Profizdat (1958).
65. A. A. GUKHMAN, Remarks on the article by A. I. VEINIK "The equation of the state of a gas", *Inzh.-Fiz. Zh.* 2, 2 (1959).
66. A. A. GUKHMAN, Reply to the objections of A. I. VEINIK, *Inzh.-Fiz. Zh.* 2, 3 (1959).

67. A. A. GUKHMAN and E. A. ERMAKOVA, *On the Essence of the Similarity Theory*. Izd. Mosk. Inst. Khim. Mash. (1959).
68. A. A. GUKHMAN, On the modern state of the similarity theory, in *Proceedings of Higher Educational Institutions Conference on the Similarity Theory and its Applications to Heat Engineering*, Moscow (1961).
69. A. A. GUKHMAN and A. F. GANDELSMAN, The application of the entropy method to the determination of displacement thickness for adiabatic flow, *Inzh.-Fiz. Zh.* **4**, 9 (1961).
70. A. A. GUKHMAN, Application of the entropy method to investigation of transonic adiabatic flows, *Int. J. Heat Mass Transfer* **5**, 889 (1962).
71. A. A. GUKHMAN, A. F. GANDELSMAN, L. N. NAURITS and V. V. USANOV, Peculiarities of supersonic flows immediately adjoining the transonic region, *Inzh.-Fiz. Zh.* **6**, 6 (1963).
72. A. A. GUKHMAN, *Introduction to the Theory of Similarity*. Academic Press, New York (1965).
73. A. A. GUKHMAN, Modelling, *Fiz. Entsykl. Slov.* **3** (1963).
74. A. A. GUKHMAN, Similarity theory, *Fiz. Entsykl. Slov.* **4** (1965).
75. A. A. GUKHMAN, Analysis of dimensions, *Fiz. Entsykl. Slov.* **4** (1965).
76. A. A. GUKHMAN and E. A. ERMAKOVA, Some experimental results on evaporation from solid state under vacuum, Collected papers, *Teplo-massoperenos* **3** (1965).
77. A. A. GUKHMAN, The theory of similarity, its essence, methods and real possibilities, *Khim. Prom.* No. 7 (1965).
78. A. A. GUKHMAN, N. B. KONDUKOV *et al.*, Peculiarities of transfer processes in fluidized bed, in *Proceedings of the 3rd International Heat Transfer Conference*, Vol. 4 (1966).

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