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Leonid Ossipkov

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MATHEMATICAL METHODS IN STUDYING THE STRUCTURE AND DYNAMICS OF GRAVITATING SYSTEMS

*Proceedings of the Conference held in Kosalma,
Karelia, Russia, June 15-18, 1993*

PART I

*Edited by L. Ossipkov, St. Petersburg State University,
St. Petersburg, Russia*

PREFACE

This issue contains the first part of the Proceedings of the International Conference "Mathematical Methods in Studying the Structure and Dynamics of Gravitating Systems". The Conference was held in the camping Kosalma near Petrozavodsk, Karelia, on 15-18 June 1993. It was organized by Petrozavodsk State University and St. Petersburg State University under support of the Astronomical Society (of the former Soviet Union), its Co-Chairman Dr. N. Bochkarev and Russian Foundation of Fundamental Research. It is the honor for us to express them our thanks. We are also grateful to Professor B. Fesenko, Professor B. Kondrat'ev, Dr. O. Zheleznyak and some other persons for sponsoring the Conference.

The Scientific Organizing Committee was as follows: S. Kutuzov (Chairman), A. Chernin, A. Mülläri, V. Orlov (Secretary), L. Ossipkov, I. Petrovskaya, and N. Pitjev. The Chairmen of the sessions were: A. Chernin, C. Hunter, A. Fridman, L. Ossipkov, Yu. Efremov, V. Polyachenko, S. Kutuzov, and B. Kondrat'ev. Altogether, there were done 37 oral talks (amongst them, 22 were in English).

Most of the works submitted to the Conference deal with various problems of the dynamics of stellar systems and related topics in dynamical astronomy and galactic astronomy. Traditionally, mathematical problems are common in studying such problems, and their further development is especially necessary for present-day investigations performed, as a rule, with a wide use of computers.

Many interesting results at a high level were reported at the Conference and some new ideas were expressed in the course of fruitful discussions. Not only well-known researches but many young members of the Conference were among active participants of the discussions.

It has happened so that the Conference has been the 18th Meeting on stellar dynamics at the territory of the former Soviet Union. In 1960, the third Plenum of the Commission on Stellar Astronomy of the Astronomical Council decided to organize Working Groups in the frameworks of the Commission. One of them was Working Group on Stellar Kinematics and Dynamics of Stellar Systems. In 1964, it was reorganized into the Working Group on Dynamics of Stellar Systems. The Working group led by Professor K. F. Ogorodnikov existed until 1973 and has organized ten meetings: Leningrad, January 1962 (see *Astron. Zh.* 39, 772, 1962); Alma-Ata, Oc-

tober 1963; Leningrad, May 1964; Tartu, May 1965; Kiev, 1966; Leningrad, October 1967 (joint with the Commission on Celestial Mechanics); Tbilisi, September 1968; Leningrad, June 1969 (joint with the Working Group on Structure and Kinematics of the Galaxy led by Dr. E. D. Pavlovskaya); Dushanbe, October 1970; Alma-Ata, October 1972 (see *Astron. Zh.* 50, 667, 1973). Materials of the conferences held in Alma-Ata were published as collections of papers "Kinematics and Dynamics of Stellar Systems and Physics of Interstellar Medium" (Trudy Astrofiz. Inst. (Alma-Ata), Vol. V, 1965) and "Dynamics of Galaxies and Star Clusters" (Alma-Ata, 1973).

The time of the existence of the Working Group is characterized by a violent development of the stellar dynamics, both its classical branches (integrals of motion, self-consistent models, relaxation), and the new ones connected with applying methods of plasma physics (collective processes) and numerical experiments. There appeared some new centers of stellar dynamics in Dushanbe, Rostov-on-Don, Irkutsk, Sverdlovsk.

The reorganization of the Astronomical Council in 1972 led to abolishing working groups. The latter has made very difficult the organization of new conferences. The next, 11th Meeting on Stellar Dynamics was in reality a work of the corresponding sections of the All-Union Conference on Plasma Astrophysics held in Irkutsk, July-August 1976 and organized under the initiative of Professor A. M. Fridman. In 1978, the Working Group was restored under the name "Dynamics of Galaxies". Professor T. A. Agekian has become its Chairman. But, in stagnation conditions, several attempts to held new meetings failed. Specialists in Stellar Dynamics working at different institutions met only occasionally.

Only in September 1985, Professors A. G. Morozov and A. M. Fridman succeeded in organizing in Volgograd the Conference "Collective Processes in Gravitating Systems and their Observational Manifestations" devoted to the memory of Professor K. F. Ogorodnikov. In reality, it was the 12th Meeting on Stellar Dynamics. Four years later the following conference of such kind (the 15th Meeting) was held, also in Volgograd (see the book of abstracts "Classical Graviphysics", Volgograd, 1989). In September 1987, the Corresponding Member of Kazakh Academy of Sciences T. B. Omarov organized in Alma-Ata the Joint Conference of the working groups "Dynamics of Galaxies" and "Analytical Methods of Celestial Mechanics" (see the book of abstracts "Dynamics of Gravitating Systems and Methods of Analytical Celestial Mechanics", Alma-Ata, 1987 and Proceedings of the Conference "Problems of Celestial Mechanics and Stellar Dynamics", Alma-Ata, 1990). It was the 13th Meeting on Stellar Dynamics. The next, 14th Meeting was held in Leningrad (Pulkovo) in May 1988 and was joint with the working group "Star Clusters". The 16th Meeting was held in Tashkent in October 1989 (see the book of abstracts "Problems of Physics of Galaxies", Tashkent, 1989), and the 17th Meeting devoted to the memory of Professor K. A. Barkhatova was in Sverdlovsk, October 1990.

Political and economic events of the last years prevented holding conferences that were planned. However the most of the specialists supported Dr. A. Mülläri's idea to organize the conference on Stellar Dynamics in Karelia, 1993. The number of

participants was happened to be larger than we could hope. Some of the researchers presented posters.

The Local Organizing Committee led by Dr. A. Mülläri has performed an enormous work providing conditions for work and rest for the Conference participants. It is necessary to mention excursion tours to Kivach, Kizhi, and Petrozavodsk.

This and the next issues include the oral talks and posters submitted to the Conference or sent some time later. In some cases we could use only texts of abstracts. Also discussions were included in the cases when their participants have written down the texts of the questions and answers.

It is a pleasure for me to thank Dr. V. Orlov for help in editing the Proceedings of the Conference.

Leonid Ossipkov

Dedicated to Professor T. A. Agekian on the occasion of his eightieth birthday.