Mechanics school

Mechanics' development in Kazan University began due to **N.I. Lobachevskiy** in 30-s of XIX century. N.I. Lobachevskiy carried out an important research on kinematics and dynamics of rigid body.

Critical contribution in mechanics was also made by **A.F. Popov, I.S. Gromeka, A.P. Kotelnikov, D.N. Zeiliger, N.N. Parfentiev and E.A. Bolotov**. A.F. Popov's research is dedicated mainly to the waves theory. I.S. Gromeka initiated the development of screw, cross current and swirling in the sphere flows' theories. He also conducted valuable research on the theories of capillarity, liquid motion in cylindric trumpets and popular in hydromechanics form of liquid motion equalities. Due to the works of A.P. Kotelnikov the basis of mechanics in non-Euclidean space was laid. In the sphere of hydromechanics he studied the jet theory. D.N. Zeiliger worked mainly in the sphere of flexible body mechanics and ruled surface geometry. N.N. Parfentiev's works cover wide range of mechanics' and mathematics' issues. To him belongs the initiative of creating the photoelasticity laboratory at the university. E.A. Bolotov's works belong to the variational principles of mechanics. He proved the principle more general than the one of Gauss.

Big success in mechanics in Kazan University was achieved after the Great Russian revolution. The scientific school of movement stability theory was established in 30-s by **N.G. Chetaev**. This school dealt with the development and deepening of the great Russian scholar, academician A.M. Lyapunov's fundamental research. To N.G. Chetaev belong significant results on analytical mechanics and stability theories, achieved when he lived in Kazan; conversion of Lagrange theory about equilibrium stability, provement of the general theorem about movement instability, research of dynamic equalities in representations of groups of infinitesimal transformations and studies belonging to the modification of Gauss principle. N.G. Chetaev's activity in Kazan was also of big importance for the development of the aerodynamic direction. Professors **G.V. Kamenkov, M.Sh. Aminov, S.G. Nuzhin, P.A. Kuzmin** and others came from the Kazan school of stability theory.

In after-war years a new direction appeared – opposite boundary value problems and their applications in mechanics. To this direction belong the works of **G.G. Tumashev, M.T. Nuzhin** and others. For example, **N.B. Ilinskiy** developed general principles of opposite boundary value problems of filtration and aerohydrodynamics theory. **S.F. Saikin** was developing hydrodynamic methods of following the movement of water-oil contact border. **V.J. Bulygin** was the first

who used the numeral methods for the studying of two-phase filtration progress and modeling of the processes in real Tataria deposits. **J.M. Molokovich** developed the oil filtration theory with the initial gradient and originated relaxational filtration theory. On the base of jet theory **E.V. Skvortsov** studied the displacement of anomalous oil with water in situ. **A.V. Kosterin** and E.V. Skvortsov developed the filtration theory in deformable situ.

A.V. Kosterin built the variational theory of non-linear filtrational consolidation. A.N. Chekalin developed new numeral methods of two-phase filtration accounting. **N.D. Jakimov** proved the number of variational theorems in filtration theory.

A.V. Kuznetsov developed the theory of non-stationary slightly disturbed liquid flow with free borders. **O.M. Kiselev** suggested new methods in the liquid and gas flow theory in the sphere with unknown borders. **L.M. Kotlyar** made critical contribution in non-linear jet theory. **D.V. Maklakov** developed new analytical and numeral-analytical methods of studying jet, wave and cavitation liquid flows. **To A.M. Elizarov** belong groundbreaking results in the problem of regulating solutions of incorrect opposite boundary value problems for analytical functions, and solution of the problems of aerodynamic forms' optimal projection.

V.V. Klokov carried out research in the sphere of technological problems of dimensional electrochemical metal treatment (problems of anode formation accounting, determination of the parameters of electrolyte flow in backlash.

Basic directions of contemporary studies in the sphere of deformable rigid body theory were marked by **N.N. Parfentiev** and **H.M. Mushtari**. In pre-war years professor H.M. Mushtari made important generalizations of linear and non-linear shell theory in case of orthotropic material, and provided numerous applications of this theory for solving stability problems of elastic equilibrium of cylindrical and conic shells. Groundbreaking for the non-linear theory of elasticity theory results were achieved by **K.Z. Galimov**. He marked general methods and approaches to the analysis of tense-deformed body condition during spontaneous movements, got equalities of deformations' nonseparability, determined physical correspondence between the components of deformation tensors and tensions during spontaneous movements and deformations, received basic equalities of static body, gave their modification in components of symmetric tensor of tension and developed variational methods of problem solving.

In the early 60-s appeared a new approach to the research in the sphere of elasticity, which successfully developed under the direction of **A.V. Sachenkov**. Combined theoretical-experimental analysis of general equalities and boundary

conditions, developed by him, lets without solving the equalities get target structural dependences or formula with the exactness of some constants or functions, definition of which becomes then the task of the experiment. **J.G. Konoplev** conducted research in the sphere of dynamic shell stability. **J.P. Zhigalko** studied local strength of shells in thermo influences. **J.P. Artukhin** solved the number of geometric non-linear contact problems for membrane and thin plastins. **A.I. Golovanov** carried out research in the sphere of non-linear ground mechanics and non-linear elastic equilibrium mechanics.