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(*b*. Arkhangelsk, Russia, 10 August 1859; *d*. Leningrad, U.S.S.R., 7 January 1935)

mechanics, mathematics.

Meshchersky was born into a family of modest means, but succeeded in obtaining a good education. He was enrolled in the Arkhangelsk Gymnasium in 1871, and graduated from it with a gold medal after seven years. He entered St. Petersburg University in 1878, and undertook the study of mathematics, attending the lectures of Chebyshev, A. N. Korkin, and A. Possé; he simultaneously studied mechanics. He graduated in 1882 but remained at the university to begin his own academic career. He passed the examinations for the master's degree in applied mathematics in 1889 and became a *Privatdozent* the following year.

In 1891 Meshchersky was appointed to the chair of mechanics at the St. Petersburg Women's College, a post that he retained until 1919, when the college was incorporated into the university. In 1897 he defended a dissertation entitled *Dinamika tochki peremennoy massy* ("The Dynamics of a Point of Variable Mass") before the Physics and Mathematics Faculty of St. Petersburg University and was awarded a doctorate in applied mathematics. In 1902 Meshchersky was invited to head the department of applied mathematics at the newly founded St. Petersburg Polytechnic Institute (now the Leningrad M. I. Kalin Polytechnic Institute), for which he had helped to develop a curriculum.

Meshchersky taught at St. Petersburg University for twenty-five years and at the Polytechnic Institute for thirty-three. He was a conscientious and innovative pedagogue. Among other things, he was concerned with drafting a scientific-methodological guide to the teaching of mathematics and mechanics; his *Prepodavanie mekhaniki i mekhanicheskie kollektsii v nekotorykh vysshikh uchebnykh zavedeniakh Italii, Frantsii, Shveytsarii i Germanii* ("The Teaching of Mechanics and Mechanics Collections in Certain Institutions of Higher Education in Italy, France, Switzerland, and Germany"; 1895)contributed significantly toward raising the standards of the teaching of mechanics in Russia. Meshehersky's own course in theoretical mechanics became famous, while his textbook on that subject, *Sbornik zadach po teoreticheskoy mekhanike* ("A Collection of Problems in Theoretical Mechanics"), published in 1914, went through twenty-four editions and became a standard work.

Meshchersky's purely scientific work was devoted to the motion of bodies of variable mass. He reported the results of his first investigations of the problem at a meeting of the St. Petersburg Mathematical Society held on 27 January 1893, then made it the subject of the doctoral dissertation that he presented four years later. He began the thesis *Dinamika tochki peremennoy massy* with a discussion of the many instances in which the mass of a moving body changes, citing as examples the increase of the mass of the earth occasioned by meteorites falling on it; the increase of the mass of an iceberg with freezing and its decrease with thawing; the increase of the mass of the sun through its gathering of cosmic dust and its decrease with radiation; the decrease of the mass of a rocket as its fuel is consumed; the decrease of the mass of a balloon as its ballast is discarded; and the increase of the mass of a captive balloon as it draws its tether with it in rising.

Having defined the problem, Meshchersky considered it physically. He established that if the mass of a point changes during motion, then Newton's second law of motion must be replaced by an equation of the motion of a point of variable mass wherein ($\bar{F}$ and $\bar{R}$ being the given and the reactive forces, respectively), where and .

This natural generalization of the equation of motion of classical mechanics is now called Meshchersky's equation. In his second important work, "Uravnenia dvizhenia tochki peremennoy massy v obshchem sluchae" ("Equations of the Motion of a Point of Variable Mass in the General Case." 1904), Meshchersky gave his theory a definitive and elegant expression, establishing the general equation of motion of a point of which the mass is changing by the simultaneous incorporation and elimination of particles.

In developing the theoretical foundations of the dynamics of a point of variable mass, Meshchersky opened a new area of theoretical mechanics. He also examined a number of specific problems, including the ascending motion of a rocket and the vertical motion of a balloon. His exceptionally thorough general investigation of the motion of a point of variable mass under the influence of a central force led to a new celestial mechanics; he was further concerned with the motions of comets. He was, moreover, the first to formulate, from given external forces and given trajectories, the so-called inverse problems in determining the law for the change of mass.

Meshchersky published a number of papers on general mechanics. In "Differentsialnye svyazi v sluchae odnoy materialnoy tochki" ("Differential Ties in the Case of One Material Point"; 1887), he examined the motion of a point subjected to a nonholonomic tie, which is neither ideal nor linear. In "O teoreme Puassona pri sushchestvovanii uslovnykh uravneny" ("On Poisson's Theorem on the Existence of Conditional Arbitrary Equations"; 1890), he took up the integration of dynamical equations, while in "Sur un probléme de Jacobi" (1894), he gave a generalization of Jacobi's results. A paper of 1919, "Gidrodinamicheskaya analogia prokatki" ("A Hydrodynamic Analogue of Rolling"), is of particular interest because it contains Meshchersky's ingenious attempt to elucidate the equations of motion rolling bodies in terms of those for a viscous fluid.

Meshchersky's work on the motion of bodies of variable mass remains his most important contribution to science. His pioneering studies formed the basis for much of the rocket technology and dynamics that was developed rapidly following World War II.

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