Fuss, Nicolaus (or Nikolai Ivanovich Fus) | Encyclopedia.com

(*b*. Basel, Switzerland, 30 January, 1755; *d*. St. Petersburg, Russia, 4 January 1826)

mathematics, astronomy.

Fuss was born into a Swiss family of modest means. His mathematical abilities, which manifested themselves quite early, attracted the attention of a number of prominent scholars, including Daniel Bernoulli, who in 1772 recommended him to Euler, then living in Russia, as a secretary. Fuss arrived in St. Petersburg at the age of seventeen and spent the rest of his life in Russia.

Fuss wrote his first papers, which had purely practical goals, under Euler's direct guidance. These were *Instruction détaillée pour porter les lunettes . . .* (1774) and *Éclaircissemens sur les établissemens publics en faveur tant des veuves . . .* (1776). The latter concerns problems of the insurance business.

In January 1776, Fuss was selected as a junior scientific assistant of the St. Petersburg Academy of Sciences; in February 1783, he became an academician in higher mathematics; and from September 1800 until his death he was the academy's permanent secretary.

The majority of Fuss's writings contain solutions to problems raised in Euler's works. They deal with several branches of mathematics (spherical geometry, trigonometry, the theory of series, the geometry of curves, the integration of differential equations) and with mechanics, astronomy, and geodesy. From 1774—the year of his first published paper—more than 100 of his articles appeared in the publications of the St. Petersburg Academy of Sciences.

Fuss's best papers deal with spherical geometry, the problems of which he worked out with the St. Petersburg academicians A. J. Lexell and F. T. Schubert. In his first paper on spherical geometry, which was published in *Nova acta Academiae scientiarum imperialis Petropolitanae* (1788), he gave solutions to three new problems concerning spherical triangles which are constructed on a given base, between two given great circles, and satisfy certain extremal conditions. In another article (1788) the characteristics of a spherical ellipse, i.e., of the geometrical locus of the vertexes of spherical triangles with a given base and a sum of two other sides, are studied in detail.

Fuss was also responsible for new solutions to a number of difficult problems in elementary geometry. These included Apollonius' problem of constructing a circle tangent to three given circles (1790) and Cramer's problem—which generalizes Pappus' problem—of inscribing a triangle inside a given circle, such that the sides of the triangle, or their extensions, pass through three given points (1783).

In differential geometry Fuss solved a number of problems concerning the determination of the properties of curves which are defined by certain relationships between the radius of curvature, the radius vector, and the length of an arc (1789). These papers partially bordered on so-called intrinsic geometry, which was developed into an independent mathematical discipline by Ernesto Cesàro and others at the end of the nineteenth century.

Fuss was an honorary member of the Berlin, Swedish, and Danish academies. In 1778 the Paris Academy of Sciences awarded him a prize for his astronomical paper "Recherche sur le dérangement d'une cométe qui passe prés d'une planète" (*Mémoires des savants étrangers*, **10** [1785]). In 1798 a prize was awarded to him by the Danish Society of Sciences for his paper *Versuch einer Theorie des Widerstandes zwei-und vierrädiger Wagen usw*. (Copenhagen, 1798).

Fuss also did much in the field of education. He taught for many years at the military and naval cadet academies. At the beginning of the nineteenth century he was active in the reform of the Russian national education system. He compiled a number of textbooks, including *Leçons de géométrie à l'usage du Corps impérial des cadets . . .* (St. Petersburg, 1798), *Nachalnye osnovania ploskoy trigonometrc, vysshey geometrii i differentsialnogo ischislenia* ("Foundations of Plane Trigonometry, Higher Geometry, and Differential and Integral Calculus," 3 vols., St. Petersburg, 1804), and *Nachalnye osnovania chistoy matematiki* ("Fundamentals of Pure Mathematics," 3 vols., St. Petersburg, 1810–1812). These textbooks show the influence of all of Euler's work, especially his Vollständige Anleitung zur Algebra (2 vols., St. Petersburg, 1770),

which Fuss used as a model in compiling a handbook for the cadet corps and the first algebra textbook for Russian Gymnasiums.

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