Delaunay, Charles-Eugéne | Encyclopedia.com

(*b*. Lusigny, France, 9 April 1816; *d*. at sea, near Cherbourg, France, 5 August 1872)

celestial mechanics.

Delaunay's father, Jacques-Hubert, was a surveyor who later bought the office of bailiff. His mother, Catherine, was his confidante all his life, especially after the death of his wife in 1849. A bright pupil in secondary school at Troyes, he showed such a gift for mathematics that he was admitted to the École Polytechnique in 1834 and graduated in 1836, first in his class. He received the newly established Laplace Prize, consisting of the complete works of Laplace, which led to his interest in celestial mechanics.

Although Delaunay was by assignment a mining engineer, he served in various engineering schools and at the University of Paris as professor of mechanics, mathematics, or astronomy. His first researches were on calculus of variations ("De la distinction des maxima et des minima dans les questions qui dépendent de la meéthode des variations," 1841, doctor's thesis), on perturbations of Uranus (1842), and on the theory of tides (1844). Delaunay's work in lunar theory started in the 1840's. He published the principle of what is known as the Delaunay method in 1846 and generalized it in 1855.

The Delaunay method, further developed by Anders Lindstedt, Poincaré, and Hugo von Zeipel, was a major contribution to analytical mechanics. It consists of a single procedure permitting elimination from the system of canonical equations, one by one, of all the terms of the disturbing function and hence the building up, term by term, of the solution of the problem. Delaunay applied his method to the moon, computing all the terms up to the seventh order and some additional ones of the eighth and ninth orders. This work was published in 1860 and 1867. It is noteworthy that, in studying the incompatibility between the observed and the computed values of the secular acceleration of the moon, Delaunay suggested that it could be caused by a slowing of the rotation of the earth by tidal friction (1865). This hypothesis is now known to be correct.

There was a long-time rivalry between Delaunay and Le Verrier. Delaunay recognized his colleague's scientific achievements but fought his dictatorial rule over astronomical research. He was appointed director of the Paris observatory in March 1870, after Le Verrier, in a dispute with the staff, was dismissed. But in the two years before his death Delaunay had to devote all his efforts to trying to save the observatory during the Franco-Prussian War and the Commune. He was a member of the Académie des Sciences (1855), the Bureau des Longitudes (1862), and the Royal Society (1869).

BIBLIOGRAPHY

Delaunay's main work is "Théorie du mouverment de la lune," in *Mémoéres de l'Académie des sciences*, **28** (1860), entire vol., 883 pages and **29** (1867), entire vol., 931 pages. Most of his findings and scientific discussions were printed **in the** *Comptes rendus hebdomadaires des séances de l'Académie des sciences* between 1841 and 1872. Among them are "Calcul des inégalités d'Uranus qui sont de l'ordre du carré de la force perturbatrice," *in Comptes rendus hebdomadaires des séances de l'Académie des sciences*, **14** (1842), 371, 406; "Mémoire sur la théorie des marées," *ibid*., **17** (1843). 344; and "Sur l'existence d'une cause nouvelle ayant une action sensible sur la valeur de l'équation séculaire de la Lune," *ibid*., **61** (1865), 1023.

The Delaunay method is presented in "Mémoire sur une nouvelle méthode pour la détermination du mouvement de la Lune," *ibid*., **22** (1846), p. 32; and a modification in "Sur une méthode d'intégration applicable au calcul des perturbations des planètes et de leurs satellites," *ibid*., **40** (1855), 335.

Further information on Delaunay's life is in ArsèneThévenot, "Biographie de Charles-Eugène Delaunay." in *Mémoires de la Société académique de l'Aube*, **42** (1878), 1–129.

J. Kovalevsky