

ABDANK-ABAKANOWICZ, Bruno

Les intégraphes - La courbe Intégrale et ses applications. Etude sur un nouveau système d'intégrateurs mécaniques.

Reference: 16913

Paris, Gauthier-Villars, 1886.

Comment: Première édition. Envoi autographe signé sur le faux-titre à Hippolyte Fontaine, industriel qui s'associera avec Zénobe Gramme, l'inventeur de la dynamo à courant continu. L'intégraphe est un instrument mécanique permettant de réaliser des intégrations de façon moins fastidieuse qu'en décomposant l'aire sous la courbe en une réunion de figures géométriques simples. Il utilise le principe de construction d'une courbe dont la pente des tangentes est donnée. Couleur du dos passée, mais bon exemplaire. /// In-8 de X, 156 pp. Demi-chagrin vert, dos à nerfs orné (Reliure de l'époque.) //// First edition. Inscribed copy. "The integraph is a noteworthy development in the history of calculating instruments. While the principle on which it is based was introduced by Coriolis in 1836, it was in 1878 that Abdank-Abakanowicz first developed a practical working model. The integraph is an elaboration and extension of the planimeter, an earlier, simpler instrument used to measure area. It is a mechanical instrument capable of deriving the integral curve corresponding to a given curve. Hence, it is capable of solving graphically a simple differential equation. Sets of partial differential equations are commonly encountered in mathematical physics. Most branches of physics such as aerodynamics, electricity, acoustics, plasma physics, electron-physics and nuclear energy involve complex flows, motions and rates of change which may be described mathematically by partial differential equations. A well-established example from electromagnetics is the set of partial differential equations known as Maxwell's equations. In practice, differential equations can be difficult to integrate, that is to solve. The integraph is capable of solving only simple differential equations. The need to handle sets of more complex non-linear differential equations, led Vannevar Bush to develop the Differential Analyzer at MIT in the early 1930s. In turn, limitations in speed, capacity and accuracy of the Bush Differential Analyzer provided the impetus for the development of the ENIAC during World War II. Abdank-Abakanowicz's instrument could produce solutions to a commonly encountered class of simple differential equations of the form $dy/dx = F(x)$ so that $y = \int F(x)dx$. The basic approach was to draw a graph of the function F and then use the pointer on the device to trace the contour of the function. The value of the integral could then be read from the dials. The concept of the instrument was taken up and soon put into production by such well known instrument makers as the Swiss firm of Coradi in Zurich."

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