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(*b*. Paris, France, 17 July 1831; *d*. Paris, 11 December 1906), *geometry*.

A follower of the geometric tradition of Poncelet and Chasles, Amédée Mannheim, like his predecessors, spent most of his professional career associated with the École Polytechnique, which he entered in 1848. In 1850 he went to the École d'Application at Metz. While still a student he invented a type of slide rule, a modified version of which is still in use. After graduation as a lieutenant, he spent several years at various provincial garrisons. In 1859 he was appointed *répétiteur* at the École Polytechnique; in 1863, examiner; and in 1864, professor of descriptive geometry. He attained the rank of colonel in the engineering corps, retiring from the army in 1890 and from his teaching post in 1901. He was a dedicated and popular teacher, strongly devoted to the École Polytechnique, and was one of the founders of the Société Amicale des Anciens Élèves de l'École.

Mannheim worked in many branches of geometry. His primary interest was in projective geometry, and he was influenced by Chasles' work on the polar reciprocal transformation, which he further investigated with respect to metric properties. He applied these studies in his work in kinematic geometry, which he defined as the study of motion, independent of force, time, and any elements outside the moving figure. He also made significant contributions to the theory of surfaces, primarily in regard to Fresnel's wave surfaces. Most of his results can be found in his texts, *Cours de géométrie descriptive de l' École Polytechnique* (1880) and *Principes et développements de la géométrie cinématique*, (1894), which, although he was an enthusiast for the synthetic method in geometry, contained much differential geometry, as well as a good summary of that subject. In recognition of his contributions to the field of geometry Mannheim was awarded the Poncelet Prize in 1872.

BIBLIOGRAPHY

I. Original Works. Mannheim' early works on the polar reciprocal transformation include his *Théorie des polaires réciproques* (Metz, 1851); and *Transformation de propriétés métriques des figures à l'aide de la théorie des polaires réciproques* (Paris, 1857). His work in kinematic geometry is found primarily in *Cours de géométrie descriptive de l'École Polytechnique comprenant les éléments de la géométrie cinématique* (Paris, 1880; 2nd ed. 1886); and *Principes et développements de la géométrie cinématique; ouvrage contenant de nombreuses applications à la théorie des surfaces* (Paris, 1894). A complete list of his works is in Poggendroff, III, 865–866; IV, 952; and V, 801; and in the article by Loria cited below. For a list of his important papers in the theory of surfaces, see G. Loria, *Il passato ed il presente delle principali teorie geometriche*, 2nd ed. (Turin, 1896), 115.

II. Secondary Literature. For an account of Mannheim's life, see C. A. Laisant, "La vie et les travaux d'Amédée Mannheim," in *L'enseignement mathématique*, **9** (1907), 169–179. A much fuller account of his work is G. Loria, "L'opera geometrica di A. Mannheim," in *Rendiconti de Circolo matematico di Palermo*, **26** (1908), 1–63, and "A. Mannheim—Soldier and Mathematician," in *Scripta Mathematica*, **2** (1934), 337–342. Mannheim's works on the wave surface is considered in C. Niven, "On M. Mannheim' Researches on the Wave Surface," in *Quarterly Journal of Pure and Applied Mathematics*, **15** (1878), 242–257.

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