

BOOK REVIEWS

Cours de cinématique. By R. Garnier. Vol. 1, *Cinématique du point et du solide. Composition des mouvements.* 2d ed. Paris, Gauthier-Villars, 1949. 4+235 pp.

Vol. 2, *Roulement et viration. La formule de Savary et son extension à l'espace.* 2d ed. Paris, Gauthier-Villars, 1949. 8+287 pp.

Vol. 3, *Géométrie et cinématique cayleyennes.* Paris, Gauthier-Villars, 1951. 12+376 pp. 3000 fr.

Kinematics, as a domain linking geometry and mechanics, has always been a favorite subject of French geometers. These lectures by Garnier provide a new general presentation following the work of Mannheim and Koenigs, somewhat in the manner of G. Darboux's classical work on differential geometry.

After an introduction to vector analysis the first volume begins with point kinematics with many geometric applications, e.g. to geodesics. In the kinematics of the one-parameter continuous motions of a rigid body the distributions of velocity and acceleration at each instant are investigated in detail. The third chapter covers composition of motions and the theorem of Coriolis. The final chapter of this volume is devoted to the determination of a one-parameter motion by integration of its infinitesimal elements.

In the second volume, chapter 5 discusses plane motions, roulettes and the Euler-Savary formula for the curvature of paths, with applications to cycloids. Chapter 6 discusses spherical motions in a corresponding way. The next chapter discusses one-parameter motions in space, again in infinitesimal form and only as far as they depend on derivatives of the first order. The last chapter of this volume contains corresponding considerations for derivatives of the second order.

The third volume is especially original, containing kinematical considerations for non-euclidean geometry, introduced either in the projective fashion of Cayley and Klein or by conformal mapping into euclidean space. In the elliptic case Garnier also uses the spherical mapping of Hjelmslev, Fubini, and Study. Chapter 10 is devoted to this geometrical introduction of non-euclidean geometry and its motions. Chapter 11 contains differential-geometric investigations of curves and surfaces, velocity and acceleration distributions. Chapter 12 contains among other things a translation of the Euler-Savary formula. The concluding chapters 13 and 14 contain differential-