extension formed by adjoining an element which satisfies an algebraic equation in R is called an algebraic extension. If the element which is adjoined does not satisfy an algebraic equation in R the extension is called transcendental.

From the simple transcendental extensions formed by the adjunction of the element x to R the author passes to the algebraic extensions by assigning to x a value which is a root of an algebraic equation.

Finally by making use of the theorem regarding the decomposition of rings the results found are extended to rings having more than one prime divisor.

G. E. WAHLIN.

Calcul des Systèmes Elastiques de la Construction. Par ERNEST FLAMARD. Paris, Gauthier-Villars, 1918.

THIS work is a treatise of 200 pages, published under the imprint of the "Encyclopédie Industrielle," on the application of the principle of least work to the calculation of the reactions and deflections of straight and curved beams, the elastic arch, and pin-connected structures having redundant members or supports.

The feature of most interest to the writer of this review is the evidence the work furnishes that there are mathematicians and engineers in France today of such mental poise that they are able to concentrate their attention on a purely theoretical question of method which brings out no new results and has absolutely no relation to the war or the future.

In this work it is first shown that the elastic forces acting on any section of a solid are reducible to three static elements consisting of a bending moment and normal and shearing forces. The expressions for the work of deformation due to these three elements are then derived, as well as Castigliano's well known theorem, giving the linear and angular displacements of the external forces and couples in terms of the partial derivatives of the work of deformation with respect to these elements. This is followed by the derivation of the principle of least work of deformation. These results are then extended to include the effect of change in temperature. In applying the results to beams under vertical loading, however, it is pointed out that the temperature forces are the only external forces acting parallel to the axis of the beam, and may therefore be considered separately and the equation of restraint due to temperature effects written once for all.

The applications begin with the simplest cases of restrained beams carrying a uniform load or a single concentrated load, and by calculation of the work of deformation, the usual results for moments and reactions at the supports, and the linear and angular deflections, are obtained.

Next in order come continuous beams of n spans with fixed ends and carrying either a uniform load in each span or a single concentrated load in one span. The principle of least work is first used to derive the theorem of three moments, which in the most general case takes the form of a quadrature. The ordinary form of this theorem for constant cross section is then deduced from the general expression as a special case, and the expressions for the linear and angular deflections in any segment are obtained in terms of the derivatives of the work of deformation.

The treatment of continuous beams is followed by the application of the same general method to curved beams, that is, beams of given curvature and having a continuous tangent, loaded uniformly over the chord, or horizontal projection, of the curve. The horizontal and vertical reactions and the moments at the supports are first obtained by applying the method of least work. The linear deflection at any point is then determined by applying a given load at this point, calculating the corresponding deflection from the partial derivatives of the work of deformation with respect to this load, and reducing the load to zero in the resulting expression. The angular deflection at any point of the beam is also obtained in the same way by applying a given couple and after using it for evaluating the derivatives of the work of deformation, reducing it to zero in the resulting formula.

Special cases are obtained from the general formulas for a beam bent into a circular arc with constant cross section, and for different conditions of end restraint. The entire process is then repeated for a curved beam carrying a single concentrated load.

The last section is an application of the general methods to statically indeterminate pin-connected systems or jointed linkworks. The treatment is divided into four cases: (1) when the system contains redundant supports; (2) when it contains redundant members; (3) when it includes redundant supports as well as redundant members; (4) mixed systems, such, for example, as a trussed continuous beam.

The method of attack consists in first separating the statically indeterminate system considered into two separate systems such that each is statically determinate. The principle of least work is then applied by equating the derivatives of the total work of deformation with respect to the reactions common to the two systems to zero, and from these conditions determining the common restraints.

To find the deflections, a unit load is placed at any specified point and the deflection is obtained from the partial derivatives of the work of deformation with respect to this unit load. To shorten the process, the work of deformation is expressed in terms of influence numbers which represent the stress in any member due to the various forces acting. These influence numbers are subsequently determined graphically by drawing a separate stress diagram for each of the applied forces or restraints.

The work throughout is mathematically rigorous, and marks a beginning in an important field, as the method of least work, although familiar as a general principle, has not been used to any extent in the theory of elasticity, and promises a complete solution of many problems which have so far received inadequate treatment. S. E. SLOCUM.

Annuaire pour l'An 1918. Publié par le Bureau des Longitudes. Paris, Gauthier-Villars, 1918.

AMONG the "Notices" of the *Annuaire* for 1918 is a timely one by M. J. Renaud, entitled "L'heure en mer." A general revision of our standards of time is one of the by-products of the war. Europe and America have largely adopted the plan of moving the clock forward one hour in summer, thus recognizing the fact that most of our daily acts are much more closely associated with the numerical names of the hours than with the altitude of the sun. Astronomers still begin their day at noon rather than midnight, but here again there is a movement on foot to synchronize the commencements of the civil and astronomical days. The time at sea, where a vessel is continually changing its longitude and therefore its local time, requires different treatment; the older methods also of fixing the "ship's time" require some alteration in view of the advent of wireless telegraphy, which enables the navigator to