

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.

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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

keep in constant touch with the land. "Local time" requires a knowledge of the ship's position and any record of events at sea is dependent at present for the hour on the accuracy of the local time. Various suggestions are considered by M. Renaud to avoid the difficulty. Perhaps the most practical is that ships' logs be kept in both local and Greenwich time and that all reports be furnished with the latter time only. Zone time is also perfectly practicable. The reader who has travelled much at sea can enjoy a relaxing hour in considering his personal preferences concerning the "how" and "when" of the daily alteration of the clock.

M. Bigourdan gives a full account of the Egyptian calendar; M. Maurice Hamy summarizes our present knowledge of the connection between solar phenomena and terrestrial magnetism and M. Emile Picard has a brief account of the life and work of Darboux. The last of these "Notices" will be read with interest as showing the varied activities of a scholar who is known to most of us solely as a pure mathematician.

Minor changes and improvements in the body of the volume are somewhat more numerous than usual. One useful feature is the addition in the Index of references to articles appearing in the three previous issues. It will be remembered that the growth of the *Annuaire* has required a division of the subjects, which are now treated in alternate years or at longer intervals. The new Index will save much trouble in searching previous volumes. The principal astronomical events and tidal data for 1919 are to be found in a supplement.

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NOTES.

THE April number (volume 19, number 2) of the *Transactions of the American Mathematical Society* contains the following papers: "Proof that certain ideals in a cyclotomic realm are principal ideals," by H. H. MITCHELL; "The order of primitive groups (III)," by W. A. MANNING; "On the degree of convergence of Birkhoff's series," by W. E. MILNE; "Problems in the theory of ordinary linear differential equations with auxiliary conditions at more than two points," by C. E. WILDER; "Transformations of applicable conjugate