

November 27, 1862.

Major-General SABINE, President, in the Chair.

In accordance with the Statutes, notice was given from the Chair of the ensuing Anniversary Meeting, and the list of Council and Officers recommended for election was read as follows :—

*President.*—Major-General Edward Sabine, R.A., D.C.L., LL.D.

*Treasurer.*—William Allen Miller, M.D., LL.D.

*Secretaries.*— $\left\{ \begin{array}{l} \text{William Sharpey, M.D., LL.D.} \\ \text{George Gabriel Stokes, Esq., M.A., D.C.L.} \end{array} \right.$

*Foreign Secretary.*—William Hallows Miller, Esq., M.A.

*Other Members of the Council.*—Benjamin Guy Babington, M.D. ; George Bowdler Buckton, Esq. ; William Benjamin Carpenter, M.D. ; Warren De la Rue, Esq., Ph.D. ; Sir Philip de M. Grey Egerton, Bart. ; Captain Douglas Galton, R.E. ; Robert Godwin-Austen, Esq. ; Joseph Henry Green, D.C.L. ; Joseph Dalton Hooker, M.D. ; John Lubbock, Esq. ; Professor James Clerk Maxwell, M.A. ; Professor Richard Owen, D.C.L., LL.D. ; Professor Henry J. Stephen Smith, M.A. ; Professor James Joseph Sylvester, M.A. ; Professor Charles Wheatstone, D.C.L. ; Rev. Robert Willis, M.A.

Mr. George Bentham and Captain Alexander Ross Clarke, R.E., were admitted into the Society.

The following communications were read :—

- I. “Dynamical Problems regarding Elastic Spheroidal Shells and Spheroids of Incompressible Liquid.” By Professor WILLIAM THOMSON, F.R.S. Received August 22, 1862.

(Abstract.)

In this paper the deformation of a homogeneous elastic solid bounded by two surfaces which are concentric spherical surfaces when the solid is free from strain, is investigated under each of the two following conditions :—

- I. The displacement of every point of each surface is given.

II. The force per unit of area is given in magnitude and direction at each point of each surface.

The formulæ are applied to determine the deformation produced in the earth by the tide-generating forces of the moon and sun, on certain definite hypotheses as to the rigidity of the earth. Thus the theoretical results used in a previous communication by the same author, "On the Rigidity of the Earth" (Proceedings of the Royal Society, May 15, 1862), are proved.

II. "On the Exact Form and Motion of Waves at and near the Surface of Deep Water." By Professor W. J. MACQUORN RANKINE, C.E., F.R.S. &c. Received September 27, 1862.

(Abstract.)

The investigations of the Astronomer Royal and of other mathematicians on the question of straight-crested parallel waves in a liquid, are based on the supposition that the displacements of the particles are small compared with the length of a wave. Hence it has been very generally inferred that the results of those investigations are approximate only, when applied to waves in which the displacements, as compared with the length of a wave, are considerable.

In the present paper, the author proves that one of those results, viz., that in very deep water the particles move with a uniform velocity in vertical circles whose radii diminish in geometrical progression with increased depth, and consequently that surfaces of equal pressure, including the upper surface, are trochoidal,—is exact for all displacements, how great soever.

The trochoidal form of waves was first explicitly described by Mr. Scott Russell; but no demonstration of its exactly fulfilling the cinematographical and dynamical conditions of the question has yet been published.

In 'A Manual of Applied Mechanics' (first published in 1858), the author stated that the theory of rolling waves might be deduced from that of the positions assumed by the surface of a mass of water revolving in a vertical plane about a horizontal axis; but as the theory of such waves was foreign to the subject of the book, he deferred until now the publication of the investigation on which that statement was founded.