A GENERALISATION OF A THEOREM OF M. PICARD WITH REGARD TO INTEGRALS OF THE FIRST KIND OF TOTAL DIFFERENTIALS

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To the integrals connected with a plane curve, which are associated with the name of ABEL, correspond two distinct classes of integrals connected with an algebraic surface, viz. double integrals and integrals of total differentials. The latter were introduced into mathematical science by M. PICARD and a large part of what is at present known about them is due to him[1].

If a surface of order n,

$$f(x, y, z, w) = 0, \tag{1}$$

admits of an integral of the *first* kind, it is necessary that four homogeneous polynomials, $\theta_1, \theta_2, \theta_3, \theta_4$, of order $n-3$, should exist, which satisfy the identity

$$\theta_1 f_x + \theta_2 f_y + \theta_3 f_z + \theta_4 f_w = 0, \tag{2}$$

and that the determinants of order $n-2$, belonging to the array

$$\left\| \begin{matrix} \theta_1, & \theta_2, & \theta_3, & \theta_4 \\ x, & y, & z, & w \end{matrix} \right\|,$$

[1] M. PICARD's first important memoir on the subject appeared in LIOUVILLE'S Journal, sér. IV, t. 1 (1885); the chief results are to be found in the *Théorie des fonctions algébriques de deux variables indépendantes,* which he published in 1897 in conjunction with M. SIMART. All the results which I use are contained in chapter V of this book.

Acta mathematica. 27. Imprimé le 5 janvier 1903.