variations of sign in (2); for $x=-\infty$ there are $s$, thus $H_n(x)=0$ has at least $\sigma$ real roots.

We now consider the general case that the sequence (2) has common roots. With Weber we may dispose of this case as follows. Suppose e.g. that $H_k$, $H_{k-1}$ have common roots. We vary the terms $a_{ij}$ of $H_k$ not in $H_{k-1}$ by small amounts numerically less than some $\eta$, so that $H_k$, $H_{k-1}$ do not have common roots.

In this way we may replace (2) by another sequence

$$K_n, K_{n-1}, K_{n-2}, \cdots, K_1, K_0 = 1 \tag{5}$$

no two of which have a common root. The roots of $K_n=0$ differ from those of $H_n=0$ by an amount as small as we please, for sufficiently small $\eta$, moreover the signs of corresponding elements of the sequences (2), (5) are the same for an $x$ for which no element of (2) vanishes. As Theorem I holds for (5), it must hold for (2).

THEOREM II. *The roots of the secular equations are all real.*

For in this equation $s=0$; hence $\sigma=n$.

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# A GENERALIZED TWO-DIMENSIONAL POTENTIAL PROBLEM

BY J. R. CARSON

It may be shown that the solution of the problem of electromagnetic wave propagation along a system of straight parallel conductors can be reduced to the solution* of two subsidiary problems: (1) a well known problem in two-dimensional potential theory; and (2) a generalization of the two-dimensional potential problem which is believed to be novel. The generalized problem is believed to possess suffi-

* Subject to certain restrictions to be discussed in a forthcoming paper.