FIELD CONCENTRATION NEAR CIRCULAR CONDUCTORS

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1. **Introduction.** The problem considered in this note is the calculation of the maximum field concentration which obtains in the field shown in Figure 1a. Here the semicircles represent the upper half of an infinite row of cylindrical metallic conductors at a constant potential, the conductors touching each other. There is a potential difference between these and the upper plane surface, and it is required to calculate the resulting field concentration which obtains at

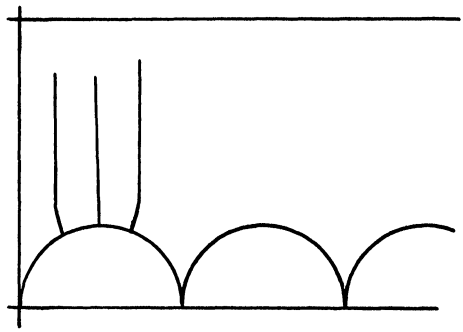

FIG. 1a

the semicircular conductors. The maximum electric gradient will obviously occur at the midpoints between the points of contact with the adjacent conductors.

It is assumed that the plane surface representing the other electrode is sufficiently far away so that the field is quite uniform near it and the field concentration is not affected by the distance between the circular wires and the plane surface. In fact, throughout the following it will be supposed that this plane is at infinity.

The above problem is of interest in the construction of electric cable where a row of circular wires is often arranged around a circular cylindrical surface and a potential difference maintained between the ions and an outer circular sheath concentric with the axis of the cylinder and external to the wires. To the first approximation the field concentration factor which obtains in Figure 1a may be carried over to the case of a cable by first assuming that the surface made up

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