

In a discussion in class, we considered the vector and scalar potential that was produced by an arbitrary distribution of charge and current density. In the results there appeared an expression for the retardation of the time. At that time the question was raised if by using a four dimensional formulation of the problem, would it be possible to find a solution that did not involve the retarded time.

After some search, a development has been found which treats a particular form of this problem and this in an approximate form. However in spite of these restrictions ( and they may be only apparent, for the method may be capable of extension ) the student deemed it of sufficient interest to indicate the chief line of development.

Although the assignment for the course called for an amplification of some passage of the class text, still it is hoped that the Professor will be indulgent to this departure from the indicated procedure. The development presented here follows the lines of the presentation in Frenkel, LEHRBUCH DER ELECTRODYNAMIK, (Berlin, Springer; 1926) pp 177-185.

In the development we consider the source to be a point charge  $e$  located at  $x'_1, x'_2, x'_3$  at the time  $t'$ . We wish to find the vector and scalar potential at an arbitrary point  $x_1, x_2, x_3$  at the time  $t$ .