

Electric field and electric potential due to a finite cylindrical surface charge distribution considering a linearly variable surface charge density

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Abstract-

This paper proposes a fast and accurate method for determining the electric potential and the radial and axial components of electric field intensity produced by a finite cylindrical surface charge distribution. The surface charge density has been modeled having a linear variation along the axial dimension of the cylinder. This consideration is very important when large bodies are to be modeled by means of an arrangement of elements (such as finite cylinders, disks, cones, etc.) allowing the matching between them and also avoiding discontinuities on charge distribution. The mathematical expressions presented in this paper have shown high computational performance while ensuring accurate and reliable results.

Index Terms- Coulomb's law, electric potential, electric field, semianalytic integral methods

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