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Alexander S. Berdnikov , Igor A. Averin , Nadezhda K. Krasnova , Konstantin V. Solovyev

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Alexander S. Berdnikov[1], *Igor A. Averin*[2], *Nadezhda K. Krasnova*[2],
Konstantin V. Solovyev [2],
[1] Institute for Analytical Instrumentation RAS,
26 Rizskiy Ave., St. Petersburg190103, Russian Federation
[2] Peter The Great St. Petersburg Polytechnic University,
29 Politekhnicheskaya St., St. Petersburg 195251, Russian Federation

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Electric and magnetic fields homogeneous in Euler's sense are a useful instrument for designing the systems of charge particle optics. The similarity principle for the charged particle trajectories in these fields was applied by Golikov for the first time to create spectrographic charge particle optical systems in a more systematic and intelligence way when using the fields being homogeneous in Euler's sense. This paper studies the Laplace potentials homogeneous in Euler's sense. The coefficients of the polynomials are functions of the two rest coordinates; they are presented not by the polynomial but ought to be the functions harmonic and homogeneous in Euler's sense. We have solved a finite chain of Poisson equations starting from the highest coefficients. By means of the proposed procedure we obtained new classes of potentials which provided a base for electric and magnetic spectrograph systems.

FUNCTION HOMOGENEOUS IN EULER'S SENSE, SIMILARITY PRINCIPLE, CHARGED PARTICLE TRAJECTORY.

Introduction

An electrostatic field is homogeneous in Euler's sense if the electric field intensity $\mathbf{E}(x,y,z)$ as a function of spatial coordinates satisfies the identity

$$\mathbf{E}(\lambda x, \lambda y, \lambda z) \equiv \lambda^{k-1}\mathbf{E}(x, y, z),$$

where k is the degree of homogeneity, in the region where the motion of charged particles occurs, for all coefficients $\lambda > 0$ [1, 2].

A magnetostatic field is uniform in Euler's sense if the magnetic field $\mathbf{B}(x,y,z)$ as a function of spatial coordinates satisfies the identity

$$\mathbf{B}(\lambda x, \lambda y, \lambda z) \equiv \lambda^{k-1}\mathbf{B}(x, y, z)$$

in the region where the motion of charged particles occurs, for all $\lambda > 0$.

If $k \neq 0$, the scalar potential describing the corresponding electric or magnetic field is a function homogeneous in Euler's sense, with the degree of homogeneity equal to k. For fields homogeneous in Euler's sense with a zero degree of homogeneity, the scalar potential is also a function homogeneous in