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SPIN 1 PARTICLE WITH ANOMALOUS MAGNETIC MOMENT AND POLARISABILITY IN PRESENCE OF UNIFORM MAGNETIC AND ELECTRIC FIELDS

In the paper we study a generalized Duffin–Kemmer equation for spin 1 particle with two characteristics, anomalous magnetic moment and polarizability in presence of external uniform magnetic and electric fields.

After separating the variables, we get the system of ten first order partial differential equations for 10 functions $f_i(r, z)$. To describe the r-dependence of 10 functions $f_A(r, z), A = 1, ..., 10$, we apply the method by Fedorov – Gronskiy; so the complete 10-component wave function is decomposed into the sum of three projective constituents, dependence of each component on the polar coordinate r is determined by only one corresponding function, $F_i(r), i = 1, 2, 3$; these three basic functions are constructed in terms of the confluent hypergeometric functions, at this there arises the quantization rule due to the presence of magnetic field.

After that we derive a system of 10 ordinary differential equations for 10 functions $f_A(z)$. This system is solved by using the elimination method and with the help of special linear combining of the involved functions. As the result, we find three separated second order differential equations, their solutions are constructed in the terms of the confluent hypergeometric functions. The numerical studied of the obtained analytical results is done.

Thus, in this paper, the three types of solutions for a vector particle with two additional electromagnetic characteristics in presence of external uniform magnetic and electric fields are found.

These results are extended to presence of uniform electric field, and into presence of both magnetic and electricfields. In the last case, the problem for solving reduce to the system of 10 partial differential equations in two cylindrical coordinates (r, z).

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