Electron Motion in a Magnetic Monopole Field and Wu-Yang Harmonics

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The thesis discusses the motion of an electron in the field of a magnetic monopole. A magnetic monopole is a hypothetical particle that, similar to a point-like electric charge, generates a radial field. However, the vector potential of a magnetic monopole is not defined throughout the entire space and is characterized by singularities. To avoid these singularities, Dirac introduced the so-called "Dirac string". However Wu and Yang approached the problem differently. They addressed the singularities of the vector potential by dividing space into regions and defining the vector potential separately in each region, ensuring that in the overlapping area of the two regions, the potentials are related by a gauge transformation. To solve the Schrödinger equation, they introduced the so-called monopole harmonics, which are a generalization of the well-known special functions — the spherical harmonics. This thesis is a literature-based review, focusing on Wu and Yang's paper on the topic, along with other relevant sources.