Equilibrium states and dynamics of magnetics with spin 1

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The classification of equilibrium states of magnetic condensed media is carried out, which symmetry is spontaneously broken relatively to rotations in spin space and translations in configurational space. The cases of quadrupolar and vector order parameter are considered. Conditions of residual symmetry and spatial symmetry of equilibrium states for such media are formulated. In the case of vector order parameter the connection of these conditions with paramagnetic, ferromagnetic, antiferromagnetic, ferrimagnetic and spiral magnetic states is established. For magnetics with quadrupolar order parameter the connection of mentioned conditions with uniaxial and biaxial magnetic nematics, magnetic cholesterics and dual spiral magnetic is found out.

Dynamics of magnetics with spin 1 in the context of Hamilton's approach is considered. For such magnetic systems there are three different cases possible. In the first of them SU(3) symmetry of equilibrium state coincides with Hamiltonian symmetry, the spin and quadrupolar matrix are motion integrals. In the second case symmetry of equilibrium state is lower than SO(3) Hamiltonian symmetry. At that the quadrupolar matrix is order parameter and only spin vector components remain motion integrals. At last the case of complete spontaneous SU(3) symmetry breaking, at that the Hamiltonian possesses SU(3) symmetry. For all mentioned cases nonlinear dynamic equations are obtained and spin waves specters are established.