Spin glasses (SG) are material whose magnetic ordered state at low temperature is a frozen disordered state instead of a periodically ordered one as is the case for ferromagnets or antiferromagnets, and is characterized by frustration and randomness. The ordering of SG been studied quite extensively as a typical example of "complex system" and continues to give an impact on surrounding areas. Many of real SG magnets, including the well-studied canonical SGs, *i.e.*, dilute magnetic alloys such as CuMn, AuFe and AgMn, are *Heisenberg-like* magnets possessing only weak magnetic anisotropy. Experimentally, while the existence of a finite-temperature SG transition and of a thermodynamic SG state in real Heisenberg-like SG material has been established, the true nature of the SG transition and of the SG ordered state has not fully been understood yet.

Theoretically, an isotropic Heisenberg model, rather than the strongly anisotropic Ising model, is expected to be a realistic model of most of real SG magnets. An interesting quantity playing an important role in recent studies on these Heisenberg-like SGs is the "chirality", which is a multispin variable representing the handedness of the noncollinear or noncoplanar structures induced by frustration. Although all authors now seem to agree that the 3D Heisenberg SG exhibits an equilibrium phase transition at a finite temperature, no consensus has still been reached concerning the nature of this transition, especially whether the chirality order occurs separately or simultaneously with the standard spin order. Indeed, a chirality scenario of experimental SG transition was proposed based on a "spin-chirality decoupling" assumption for the 3D isotropic Heisenberg SG, *i.e.*, the glass order of the chirality takes place at a temperature higher than the standard spin-glass ordering temperature. In view of the importance of understanding of the ordering properties of the 3D Heisenberg SG, and of testing the validity of the chirality scenario, we numerically investigate in this thesis the possible spin-chirality decoupling phenomena in isotropic Heisenberg SG models by extensive Monte Carlo simulations.

The thesis consists of the two parts. First, we study directly the ordering of the fully isotropic Heisenberg SG model in three dimensions. We find that the spin-glass transition occurs at a temperature about 10∼15% below the chiral-glass transition temperature. Thus, the 3D Heisenberg SG exhibits the spin-chirality decoupling. Next, aimed at understanding the possible spin-chirality decoupling phenomena in the 3D Heisenberg SG from a wider perspective, we also study the ordering of the 1D isotropic Heisenberg SG with long-range power-law interactions by extensive Monte Carlo simulations. Note that the exponent σ describing the decay of the power-law interaction effectively corresponds to the dimensionality d of the short-range model. We find that the 1D long-range model exhibits the spin-chirality decoupling phenomena in the parameter range $0.85 \lesssim \sigma \lesssim 1.0$, while some other types of ordering behaviors are realized at smaller or larger values of σ. On the basis of our numerical results, implications to the real spin-glass ordering are discussed.