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Theory of anomalous Hall and spin Hall effects in ferromagnetic metals BO GU, Advanced Science Research Center, Japan Atomic Energy Agency, TIMOTHY ZIMAN, CNRS and Institut Laue Langevin, SADAMICHI MAEKAWA, Advanced Science Research Center, Japan Atomic Energy Agency — We give a unified theory of the anomalous Hall effect (AHE) and the spin Hall effect (SHE) in ferromagnetic metals (FM). We do this by extending Kondo's theory of the AHE in FM and including the short range spin-spin correlations. We find a novel relation between the SHE and the second order nonlinear spin fluctuation in FM near Curie temperature Tc, which has been hidden for about 50 years, since Kondo gave a relation between the AHE and the first order nonlinear spin fluctuation in pure FM near Tc in 1962. Our results show an essential difference between the AHE and SHE in terms of the symmetry. Our theory can be applied to the recent SHE experiment in FM near Tc by Y. Otani et al.

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