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Spin-cluster Formation and Spin-Hall Effect in a Pyrochlore Magnet HIROAKI ISHIZUKA, KITP UCSB, Univ. Tokyo, YUKITOSHI MOTOME, Univ. Tokyo — Metallic magnets with interacting localized moments and itinerant electrons are known to be the source of various fascinating phenomena. Recent theoretical studies on the spin-charge coupled systems have shown that the presence of frustration further gives rise to nontrivial magnetic states as well as transport phenomena. These situations are expected to be realized in pyrochlore and triangular metallic magnets, which have gained much interest due to their peculiar magnetism and transport properties. In this study, to explore novel phases and transport phenomena that may take place in the frustrated spin-charge coupled systems, we studied a double-exchange model on a pyrochlore lattice with spin-ice type localized moments [1]. By using a Monte Carlo technique, we show that the model shows peculiar spin-cluster formation induced by competition between the double-exchange interaction and the super-exchange interaction between the localized moments. Furthermore, we show that the peculiar intermediate phase accompanies an unconventional spin-Hall effect which originates from noncollinear spin configurations. [1] H. Ishizuka and Y. Motome, PRB 88 100402 (2013).

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