High dimensional coupled spin model for polarity reversals

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Recently, the macro spin model has been suggested for polarity reversal (Nakamichi et al. 2012, Mori et al. 2013). This is the idea that geomagnetism is described by interaction with many local dynamo elements (called macro-spins). This model can reproduce many features of geomagnetism and the solar magnetism; power spectrum, average time of polarity flipping, randomness and periodicity of polarity reversals.We study this model to become higher dimensional model. In this result, our model becomes possible for many things which are not treated in previous study, for example reproduce migration of the North (or South) Magnetic Pole, comparison with observed data of magnetic field distributions expressed in two directions.In addition, we investigate some distribution function that the pole migration followed and make a comparison with previous study, e.g. Lévy distribution (Carbone et al., 2006) and log-normal distribution (Ryan & Sarson, 2007).

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