Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Theoretical Study on Twofold and Fourfold Symmetric Anisotropic Magnetoresistance Effect SATOSHI KOKADO, Graduate School of Integrated Science and Technology, Shizuoka University, MASAKIYO TSUNODA, Graduate School of Engineering, Tohoku University — We theoretically study the twofold and fourfold symmetric anisotropic magnetoresistance (AMR) effect [1]. We first extend our previous model [2] to a model including the crystal field effect [1]. Using the model, we next obtain an analytical expression of the AMR ratio, i.e., $\mathrm{AMR}(\phi)=C_0+C_2\cos(2\phi)+C_4\cos(4\phi)$, with $C_0=C_2-C_4$ [1]. Here, ϕ is the relative angle between the magnetization direction and the electric current direction and C_2 (C_4) is a coefficient of the twofold (fourfold) symmetric term. The coefficients C_2 and C_4 are expressed by a spin-orbit coupling constant, an exchange field, a crystal field, and s-s and s-d scattering resistivities. Using this expression, we analyze the experimental results for Fe_4N [3], in which $|C_2|$ and $|C_4|$ increase with decreasing temperature. The experimental results can be reproduced by assuming that the tetragonal distortion increases with decreasing temperature.
[1] S. Kokado *et al.*, J. Phys. Soc. Jpn. **84** (2015) 094710.
[2] S. Kokado *et al.*, J. Phys. Soc. Jpn. **81** (2012) 024705.
[3] M. Tsunoda *et al.*, Appl. Phys. Express **3** (2010) 113003.

Satoshi Kokado
Shizuoka University

Date submitted: 05 Nov 2015 Electronic form version 1.4