Title; Spin-polarized current in lateral nanostructures described by one-dimensional model

The author presents the analysis of spin transport on the nano-scaled ferromagnet/nonmagnet structures, especially on lateral spin valves. This work is an extension of Ref. [15] and includes detail descriptions. In general, I think the paper is well written for the Bachelor thesis; the paper is well organized and the author systematically discusses the spin injection/detection by changing the key parameters of interfacial resistance, spin polarizations, and a junction size. I raise some issues as below.

The author claims half-cross structure and cross structure has different spin accumulation in ferromagnet. Of course, the derived equation itself has this feature. However, I don’t understand how the claim is consistent with the fact that the spin diffusion length of Py is much shorter than the dimensions of devices. As for the actual system, the author uses Py/Cu structures where the spin diffusion length of Py = 4.3 nm is much shorter than its width and thickness = 100 nm as described in page 17 and Fig. 5. Since the spin accumulation diminishes in the scale of spin diffusion length, it should not be affected from the area far from the distance of 10 nm or so. Also, it seems related to the fact that the formula (4.19-4.25) conflicts the report by S. Takahashi and S. Maekawa [e.g. Phys. Rev. B 67 052409(2003) and JPSJ 77 031009 (2008)] which is obtained by exactly solving the same differential equations.

Small issue: the interfacial resistance $R_i$ is treated as $R_i \ll R_F = 70 \, \Omega$. GMR study reported $R_i \sim 20 \, \Omega$ for the same junction dimensions of Py/Cu [J. Bass et al, Phys. Rev. B 51 3226-3229 (1995)]. I recommend the author take care of it because it could quantitatively affect spin injection/detection efficiency and spin accumulation.

Rabnking:2