Evaluation of Gilbert damping in transition metals using tight binding schemes

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Recently first principle calculations of the damping in transition metals have reproduced the un-
usual temperature dependence observed experimentally [1, 2]. Here we present an
alternative method to calculate the Gilbert damping within Kamberský’s spin torque
correlation model using a combination of first principle calculations and an extended
Hückel tight binding model. In our scheme we use ab initio calculations (VASP) in-
cluding spin orbit coupling to obtain the band structure of the transition metal of
interest. With the knowledge of the band structure we use a fitting procedure to
construct an extended Hückel tight binding model which then allows the evaluation
of the Gilbert damping parameter. Because of the simplicity of our Hamiltonian,
we can converge the integral over the Brillouin of the spin-orbit torque without ex-
traordinary computational effort. We show that our results are in good agreement
with the results obtained from previous calculations. [1] K. Gilmore, Y.U. Idzerda

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