Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

spin pumping occurred under nonlinear spin precession HENGAN ZHOU, XIAOLONG FAN, Lanzhou University, LI MA, SHIMING ZHOU, Tongji University, DESHENG XUE, Lanzhou University — Spin pumping occurs when a pure-spin current is injected into a normal metal thin layer by an adjacent ferromagnetic metal layer undergoing ferromagnetic resonance, which can be understood as the inverse effect of spin torque, and gives access to the physics of magnetization dynamics and damping. An interesting question is that whether spin pumping occurring under nonlinear spin dynamics would differ from linear case. It is known that nonlinear spin dynamics differ distinctly from linear response, a variety of amplitude dependent nonlinear effect would present. It has been found that for spin precession angle above a few degrees, nonlinear damping term would present and dominated the dynamic energy/spin-moment dissipation. Since spin pumping are closely related to the damping process, it is interesting to ask whether the nonlinear damping term could be involved in spin pumping process. We studied the spin pumping effect occurring under nonlinear spin precession. A device which is a Pt/YIG microstrip coupled with coplanar waveguide was used. High power excitation resulted in spin precession entering in a nonlinear regime. Foldover resonance lineshape and nonlinear damping have been observed. Based on those nonlinear effects, we determined the values of the precession cone angles, and the maximum cone angle can reach a values as high as 21.5 degrees. We found that even in nonlinear regime, spin pumping is still linear, which means the nonlinear damping and foldover would not affect spin pumping process.

Xiaolong Fan
Lanzhou University

Date submitted: 06 Nov 2015 Electronic form version 1.4