Comment 1: It is important for authors to show how eq. (6) was derived (linearised) from the LLG equation, and what are the contributions taken for the effective field (applied, anisotropy, exchange, magnetostatics, eddy current .. etc.?).  The authors also need to clarify what Gamma is in this equation (in the LLG equation it should be the gyromagnetic ratio, not a damping factor).  The authors also need to clarify how they obtained the susceptibility tensor in (7) from (6).

(6)

where = = , = = and = .

Comment 2: It is not clear in Section II what material is assumed and what parameters values were used to determine the susceptibility (e.g. how did the authors work out wo - resonance frequency in (7) and Fig. 3? what was the assumed resonance mechanism and effective field contributions?). Did the authors use micromagnetic boundary conditions for the ferrite structure?

sus = new meep::gyrotropic\_susceptibility(meep::vec(ss->bias.x, ss->bias.y, ss->bias.z),

ss->frequency, ss->gamma, ss->alpha, model);

s.add\_susceptibility(two, H\_stuff, gyrotropic\_susceptibility(vec(0.0,0.0,1.0),1.0,0.001,0.00005,GYROTROPIC\_SATURATED));

Ferromagnetic resonance of the Larmor precession. Spin wave resonance/ Ferromagnetic resonance (FMR). Ferromagnetic resonance measures the absorption of microwaves, incident on a magnetic material, by spin waves. Ferromagnetic resonance is used to determine the effect of magnetocrystalline anisotropy on the dispersion of spin waves. It results from the magnetic moments of dipolar-coupled but unpaired electrons.

Microwave filters, circulators, isolators. 5G applications

When magnetoelectronic devices are operated at high frequencies, the generation of spin waves can be an important energy loss mechanism. Spin wave generation limits the linewidths and therefore the quality factors of ferrite components used in microwave devices.

tangential components and normal components are equal.  
  
Comment 3: The authors also need to make it clear in Section II that the form of the permeability/susceptibility is enforced (preset) and not an outcome of the simulations (for example in contrast to rigorous combined simulations of micromagnetics and electromagnetics in Aziz PIER B, Vol. 15, 1–29, 2009 where the magnetisation is actually computed).  In this case, the calculated impedance and transmission characteristics of the transmission line/waveguide are pre-determined since the resonance frequency and permeability are set!  
  
Comment 4: In Section III, the authors need to clearly define the geometry and dimensions of the simulated structure, the ferrite material used and material parameters (e.g. magnetic and electromagnetic).  The authors also need to specify the numerical parameters (grid cell size, time step, location of transmission line from PML, number of cells in PML .. etc.).  The source is not clear: is it a z-directed electrical current in the transmission line or is it a z-directed plane wave?  Also, what is the justification for using a 60 GHz pulse for the source (why not 10 GHz or 100 GHz)?  The authors also need to specify the magnitude and direction of the bias (DC) field.

double one(const vec &) { return 1.5; }

double two(const vec &) { return 0.1; }

double a = 25.0;

double ttot = 100.0;

grid\_volume gv = vol3d(1.0,1.0,24.0, a);

grid\_volume vol3d(double xsize, double ysize, double zsize, double a) {

if (!isinteger(xsize \* a) || !isinteger(ysize \* a) || !isinteger(zsize \* a))

master\_printf\_stderr("Warning: grid volume is not an integer number of pixels; cell size will "

"be rounded to nearest pixel.\n");

return grid\_volume(D3, a, (xsize == 0) ? 1 : (int)(xsize \* a + 0.5),

(ysize == 0) ? 1 : (int)(ysize \* a + 0.5),

(zsize == 0) ? 1 : (int)(zsize \* a + 0.5));

}

gv.center\_origin();

structure s(gv, one, pml(1.0, Z), identity());

fields f(&s);

f.use\_real\_fields();

continuous\_src\_time src(1.0);

f.add\_point\_source(Hz,src,vec(0.0,0.0,0.0));

A soft magnetic current source was placed in the middle to generate radial H field traveling along the gyrotropy z-axis. For 30-GHz wave, the wavelength is 10mm. Length of transmission line was 250mm. The smallest length used was 0.4mm. The size of magnetic domains is about 1mm. Magnetic thin film.

Resolution=100;

epsr=1;

a0=1e-5;%dx=50nm

c0=3e8;%2.99792458e8;%Speed of Light (m/s)

f0=c0/a0;%3e13 Hz

t0=1/f0;%0.33e-13s, dt=1.6667e-16

mu0=4\*pi\*(1e-7);% (H/m)

eps0=8.854187817e-12;% (F/m)

I0=1; %(A)

E0=I0/(a0\*eps0\*c0);% 3.7647e+07

D0=I0/(a0\*c0);% 3.3333e-04

B0=I0/(a0\*eps0\*c0\*c0);% 0.1255

H0=I0/(a0);% 1.0000e+05

Comment 5: The authors in page 5 make the statements "The phase constant and attenuation constant were calculated for the resultant magnetic spin wave" and "The nano-magnetic exchange interactions and dipole-dipole interactions dictated the excitation of spin wave modes".  There was no indication in Sections II or III in the article that the exchange contribution was taken into account (or how it was taken into account) - I assume since the material is saturated here, so how are spin-waves produced?  (even if the authors refer to magnetostatic waves, then the authors don't actually calculate the magnetostatic fields as they don't compute M directly)?  The authors need to clarify these statements.  
Answer: Dipole-dipole (demagnetization), anisotropy, exchange, zeeman

Answer: Ferromagnet is saturated but the 30-GHz ferromagnetic resonance causes the non-diagonal entries in the susceptibility matrix to become very large. This makes it skew symmetric. This gives rise to gyromagnetic resonance/ spin wave resonance. The propagation of spin waves is dictated by the Landau Lifshitz Gilbert equation. Propagation of spin waves is governed by the torques generated by internal and external fields. FMR arises from the precessional motion of the magnetization M of a ferromagnetic material in an external magnetic field H. The magnetic field exerts a torque on the sample magnetization which causes the magnetic moments in the sample to precess. The linewidths of absorption peaks can be greatly affected by dipolar-narrowing and exchange-broadening (quantum) effects.

Comment 6: The authors need to indicate (in the figure captions) the frequencies at which the quantities in Figures 4, 5, 6 and 7 were calculated.

Answer: I have edited the captions for Figures 4, 5, 6 and 7. The quantities were calculated at the gyromagnetic resonance frequency of 30 GHz.  
  
Comment 7: The authors also need to comment on or indicate the purpose of the equivalent circuit model they introduced in Section I with the FDTD simulations.  
  
Comment 8: Minor typing errors:  
 - Abbreviations must be defined in the text (e.g. EHF, TEM, .. etc.).  
  
 - Page 2, paragraph 2, "FDTD simulations .. "  
Answer: Defined abbreviations of EHF, TEM, FDTD, FDFD, MEEP at the point they are first used.

Reviewer: 2  
  
Comment 1: The acronyms EHF, FDFD, FDTD, MEEP are used without prior description and must be defined at the point they are first used.

Answer: Defined abbreviations of EHF, TEM, FDTD, FDFD, MEEP at the point they are first used.

Comment 2: The use of adjectives such as the word "huge" in the second paragraph of the Simulation Results section must be removed.

Answer: Removed “huge” from sentence.