

Spin waves eigenoscillations in ferromagnetic thin film with the single hole

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We investigate the influence of alternating microwave magnetic field on a Py thin film with a single circular antidot. We found that the main reason of non-uniform oscillations occurrence, i.e. emergence of spin waves, is a magnetostatic field, caused by the presence of a hole. In order to create an analytical model of small deviations from the equilibrium values of the magnetic moment and magnetic field, we solve the linearized L-L equation as an eigenproblem in the direct space. Our model shows that in the direction perpendicular to the applied static field, there is maximum magnetization amplitude which is localized near the antidot edge and it decreases amplitude with increasing the distance from the edge. We also define the conditions of the local ferromagnetic resonances, which are different in different directions, and finally visualize the resonance frequency dependency on the field magnitude.