Modulation of the spin-wave amplitude through dynamic charge-mediated magnetoelectric coupling

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We present new mechanism for manipulation of the spin-wave amplitude through the use of the dynamic charge-mediated magnetoelectric effect in ultrathin multilayers composed of dielectric thinfilm capacitors separated by a ferromagnetic bilayer. Propagating spin waves can be amplified and attenuated with rising and decreasing slopes of the oscillating voltage, respectively, locally applied to the sample. The way the spin accumulation is generated makes the interaction of the spin-transfer torque with the magnetization dynamics mode-selective and restricted to some range of spin-wave frequencies, which is in contrary to known types of the spin-transfer torque effects. The interfacial nature of spin-dependent screening [1] allows to reduce the thickness of the fixed magnetization layer to a few nanometers, thus the proposed effect significantly contributes toward realization of the magnonic devices and also miniaturization of the spintronic devices.

References:

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