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Magnon excitation and decay in Ferromagnetic Insulator/metal multilayers TAO LIU, JIAXI LI, JIANWEI ZHANG, School of Physics, Tongji University — We studied magnon excitation in a Ferromagnetic Insulator(FI) layer(such as YIG), which connected two Ferromagnetic/normal metal multilayers in two sides. In our modeling, we adopted self-consistent spin dependent Boltzmann equations in metal layers and magnon Boltzmann equation in FI layer. When applying an in-plane current in first FM layer, a transverse spin current was generated due to Anomalous Hall effect(AHE), after crossing normal metal layer, this transverse spin current will produce magnon excitation at N/FI interface. With carrying spin information, magnon excitations in FI can eventually excite a new spin current at second F/N interface. Although the FI cannot support any spin current propagation across it, but spin polarization information was passed through FI with propagation of magnon. Finally, the transverse spin current in second FM layer can also generate another in-plane spin current by AHE. The magnon excitation in FI layer is dominated by the interfacial interaction at Normal/FI boundary. Our results show the magnon in FI layer have decay behaviors to low energy model. We also showed that when applying a magnetic field on FI layer, spin current in final FM layer can be manipulated by varying magnon excitation.

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