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Spin Transfer Torque in Spin Filter Tunnel Junctions CHRISTIAN ORTIZ PAUYAC, PSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Saudi Arabia, ALAN KALITSOV, SPINTEC, UMR-8191, CEA/CNRS/UJF/GINP, INAC, F-38054 Grenoble, France, AURELIEN MANCHON, PSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Saudi Arabia, MAIR CHSHIEV, SPINTEC, UMR-8191, CEA/CNRS/UJF/GINP, INAC, F-38054 Grenoble, France — STT in MTJs is well known for its potential spin electronic applications. However, recently a new class of MTJs based on spin filtering across magnetic insulators (SFTJ) has been attracting much attention since in such MTJs electrons with a certain spin orientation tunnel much more efficiently. In this structure, STT remains to be addressed and clarified. Here we present a systematic study of its angular and voltage bias dependences consisting of one or two FM layers separated by a magnetic insulator (MI). The calculations were performed within the tight-binding model using NEGF technique in the framework of Keldysh formalism. We predict that STT is higher in magnitude compared to regular MTJs, which strongly depends in the relative directions of the magnetic states of the free layer (FM2) and MI. Namely, in case of parallel orientation of MI and FM2 moments in a FM1—MI—FM2 structure, the system behaves as a regular MTJ with a modest increase of STT magnitude. However, as the angle between MI and FM2 moments increases, the field-like torque becomes three orders of magnitude higher than the Slonczewski component and oscillates with bias as band-filling increases. This may have practical implications.

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