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Spin-Motive Force Studies in Spin-Valves JUN'ICHI IEDA, SADAMICHI MAEKAWA, CREST JST; IMR Tohoku Univ., STEWART BARNES, Physics Dept., Univ. of Miami — A spin-motive force (smf) is the counterpart of an electro-motive force, which couples to spin degrees of freedom of electrons rather than charge ones. Here we discuss how the smf works in the so-called spin-valves. Usually the observed dV/dI for spin-valves is analyzed in terms of magneto-resistance. However when the magnetization makes a sudden jump, there often appears a large peak in dV/dI, i.e., a voltage jump that is better interpreted in terms of the smf discussed here. In order to see this, we model spin-valves using an equivalent circuit that involves magnetic dissipation represented by the smf as well as electric dissipation through ordinary resisters for both majority and minority currents. There are four possible conduction paths, e.g., the majority electrons tunnel into the majority band, or into the minority band and vice versa. The first path adds an up electron to the free layer and causes a rotation in a certain sense, while the second path adds a down electron and a rotation in the opposite sense. Since the rotations are in opposite senses so is the work done on the free layer and hence the smf. The equivalent circuit with the relevant parameters predicts a stable large angle precession and the voltage signal.

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