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Spin-Orbit Assisted Chiral-Tunneling at semiconductor tunnel junctions. Study with advanced 30-band k. p methods. HENRI JAFFRES, Thales, 1 -Avenue AUgustin Fresnel, 91767 PALAISEAU, Cedex France, THI HUONG DANG, EKATERINA ERINA, VIATCHESLAV SAFAROV, Laboratoire des solides Irradies (LSI) ECOLE POLYTECHNIQUE, PALAISEAU, FRANCE, HOAI NGUYEN, Institute of Physics, VAST,, HENRI-JEAN DROUHIN, Laboratoire des solides Irradies (LSI) ECOLE POLYTECHNIQUE, PALAISEAU, FRANCE — We report on theoretical investigations and advanced k.p calculations of carrier forward scattering asymmetry vs. their incidence through interfaces and magnetic tunnel junctions (MTJ) made of semiconductors involving spin-orbit interactions (SOI). This study represents an extension to our previous contribution1 dealing with the role, on the electronic forward scattering asymmetry of the Dresselhaus interaction in the conduction band (CB) of MTJs. The role of the atomic-SOI of semiconductors is investigated afterwardsWe first developed a perturbative scattering method based on Green's function formalism and applied to the orbitally degenerated CB and VB to explain the calculated asymmetry. This particular asymmetry features are perfectly reproduced by advanced k. p tunneling approaches (30-band) in agreement with the Green's function methods at the first perturbation order in the SOI strength. This forward scattering asymmetry leads to skew-tunneling effects involving the branching of evanescent states waves. Recent experiments involving non-linear resistance variations vs. the transverse magnetization direction or current direction in the in-plane current geometry may invoke by the phenomenon we discuss.

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