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Fast Deterministic Bipolar Switching in Orthogonal Spin Torque Devices via the Control of the Relative Spin Polarizations JUNBO PARK, DANIEL C. RALPH, ROBERT A. BUHRMAN, Cornell University — We model 100 ps pulse switching dynamics of orthogonal spin transfer (OST) devices that employ an out-of-plane polarizer (OPP) and an in-plane polarizer (IPP). Simulation results indicate that increasing the spin polarization ratio, $C_P = P_{IPP}/P_{OPP}$, results in deterministic switching of the free layer without over-rotation (360 degree rotation). By using spin torque asymmetry to realize an enhanced effective P_{IPP}, we experimentally demonstrate this behavior in OST devices. Modeling predicts that decreasing the effective demagnetization field can substantially reduce the minimum C_P required to attain deterministic bipolar switching, while retaining low critical switching current, $I_p = 500$ μA.

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