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Universal absence of Walker breakdown for spin–orbit and spin Hall torque driven domain walls VETLE RISINGGARD, JACOB LINDER, Department of Physics, Norwegian University of Science and Technology — We consider ferromagnetic domain wall motion driven by spin–orbit and spin Hall torques, hereafter referred to as SOTs. Regardless of the relative importance of the reactive and dissipative components of the SOT, we find that for experimentally relevant spin–orbit coupling strengths it is possible to achieve universal absence of Walker breakdown. Specializing to the well-known Rashba and spin Hall SOTs we find dramatically different behavior for large current densities. The contribution from the Rashba SOT cancels exactly against the contribution from the spin-transfer torque, and the net velocity levels off to a constant as a function of current density. The different symmetry of the spin Hall SOT prevents such a cancellation, making the velocity an ever increasing linear function of the current. This effect is robust against the presence of interfacial Dzyaloshinskii–Moriya interaction, and is found both in perpendicular anisotropy ferromagnets and in shape anisotropy-dominated stripes. In the light of recent theoretical [Phys.Rev.B **90**, 094411 (2014); arXiv:1610.00894] and experimental [Nat.Nano. **10**, 221 (2015)] interest in antiferromagnetically coupled racetracks we consider the impact of these results in bilayer stripes coupled by interlayer exchange.

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