

The structure of domain walls determines to a large extent the properties of magnetic materials, in particular their hardness and switching behavior, it represents an essential ingredient of spintronics. Common domain walls are of Bloch and Neel types in which the magnetization rotates around a fixed axis, giving rise to a one-dimensional magnetization profile. Domain walls in helical magnets, most relevant in multiferroics, were never studied systematically. Here we show that domain walls in helical magnets are fundamentally different from Bloch and Neel walls. They are generically characterized by a two-dimensional pattern formed by a regular lattice of vortex singularities. We then discuss the deformation energy and roughness of these types of walls.