On the Magnetic Film Images of Manelas Ferrite Billet

Magnetic viewing film contains small nickel flakes that are suspended within oil. When a magnetic field is normal to the film surface the nickel flakes stand on edge and therefore do not reflect light, the film looks dark. When a magnetic field is tangential to the surface the flakes lay flat and reflect light, that area looks bright (usually green). Note that bright green does not mean there is no field normal to the surface, it simply means that the tangential field dominates. Similarly a dark region simply indicates that the normal field dominates

Two images of magnetic film above conditioned ferrite billets have been published, the first one shows a ferrite magnet that has been conditioned by bringing a circular NdFeB magnet close to the surface causing a reversal of the magnetization in that region.

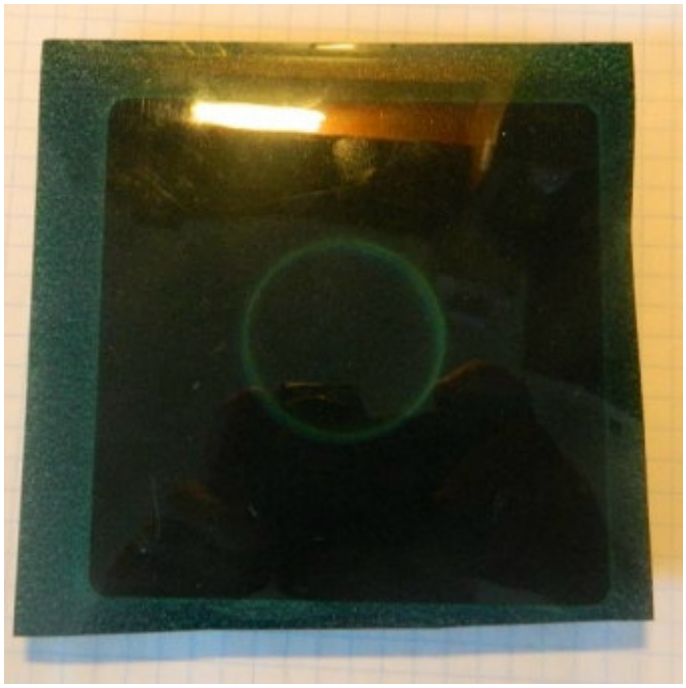

Figure 1. Ferrite magnet conditioned by a NdFeB magnet

The domain wall between the two magnetized regions is clearly seen as a green circle. Note that the region outside that circle is dark, as it must be since it is fully magnetized and is a pole face with field lines normal to the surface. Within the circle the darker area also indicates a pole face with perhaps less intense surface field.

A FEMM simulation of this is shown next where the reversed domain does not penetrate very far into the surface. Field lines are shown within the magnet and outside the magnet. The red line represents the plane of the viewing film and use is made of the FEMM facility to chart the normal and tangential field components along that line.

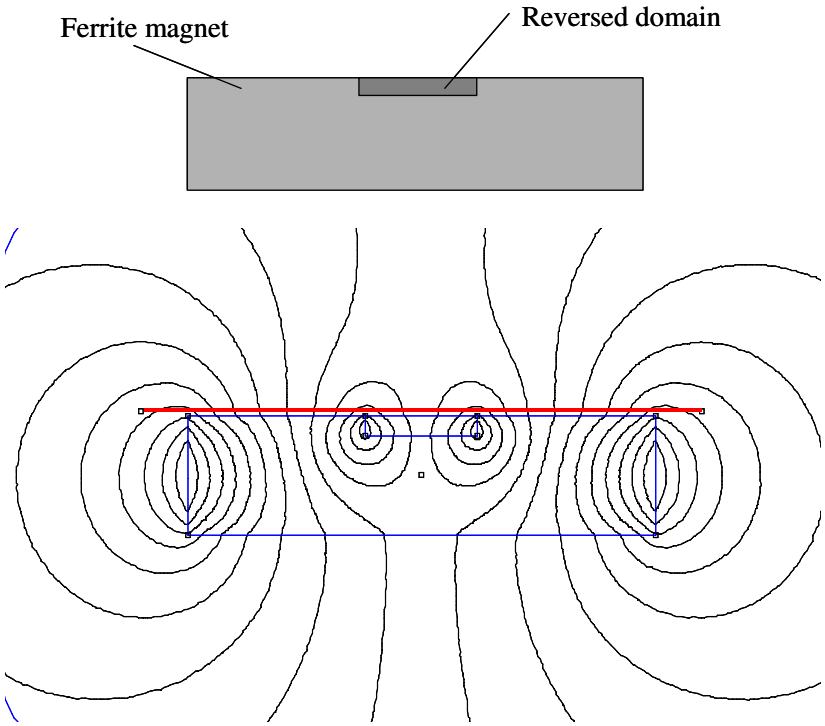

Figure 2. FEMM simulation

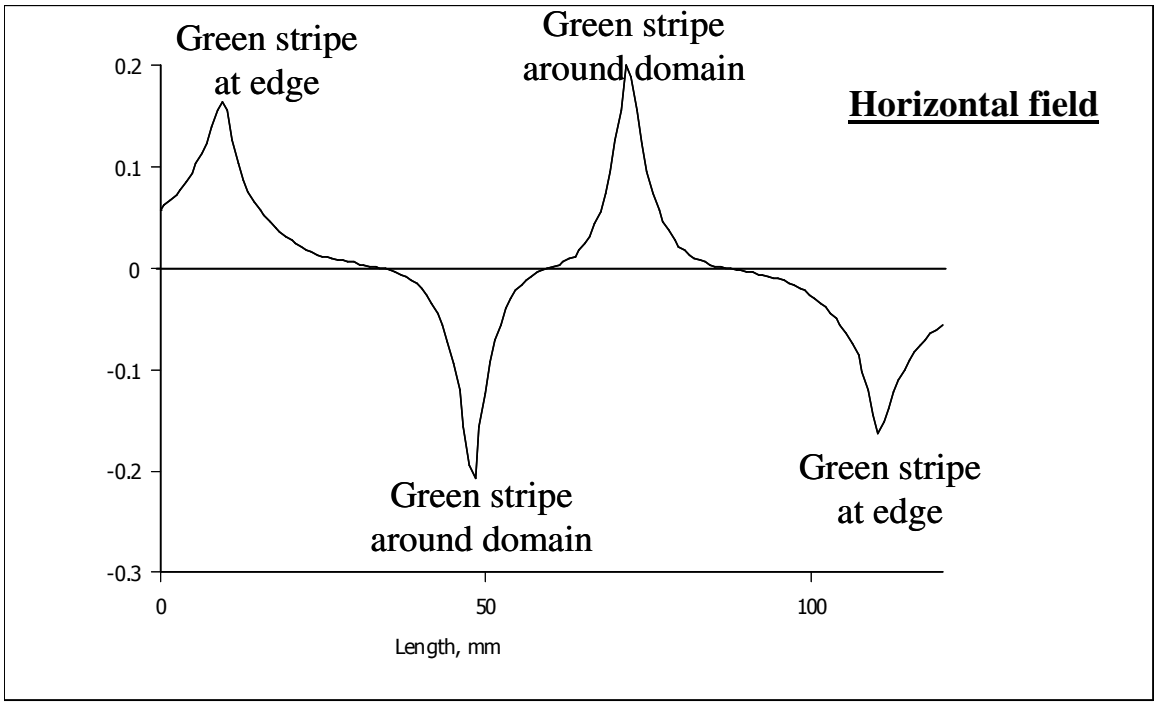

Figure 3. Tangential Field in viewing fim

The sharp peaks in the tangential field create the sharp outlines of domain wall and magnet.

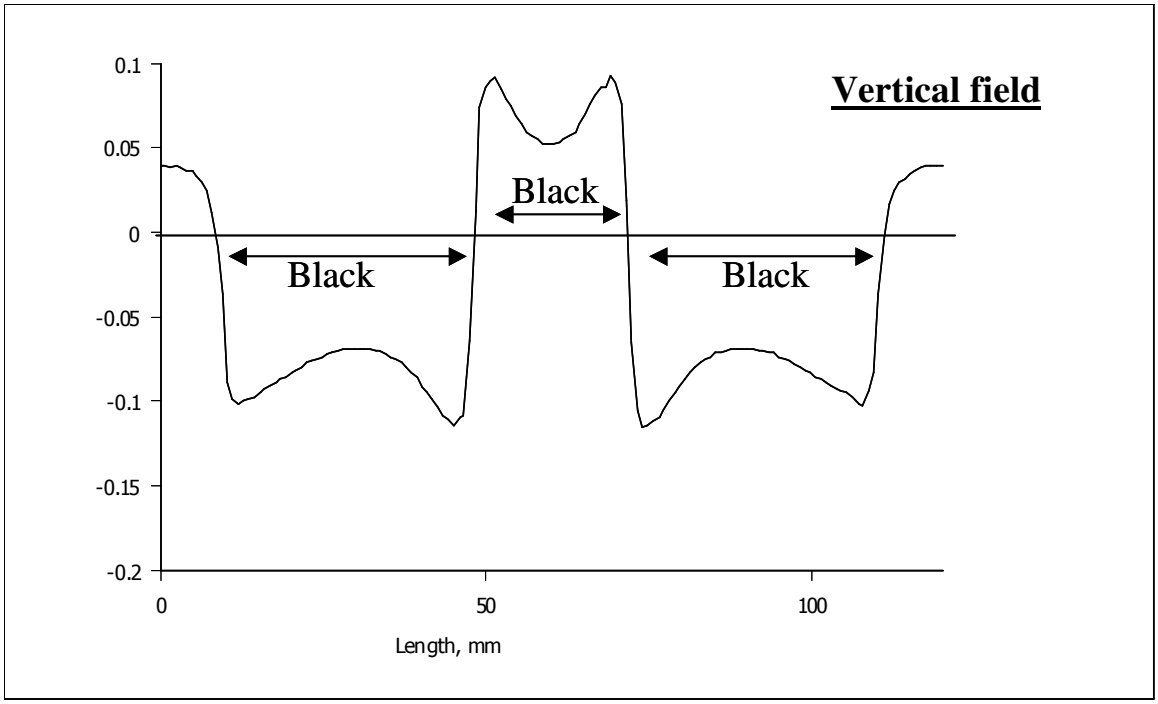

Figure 4. Field normal to the viewing film

The second image is the conditioned magnet used by Manelas that shows pole faces at the corners and at the centre of the magnet.

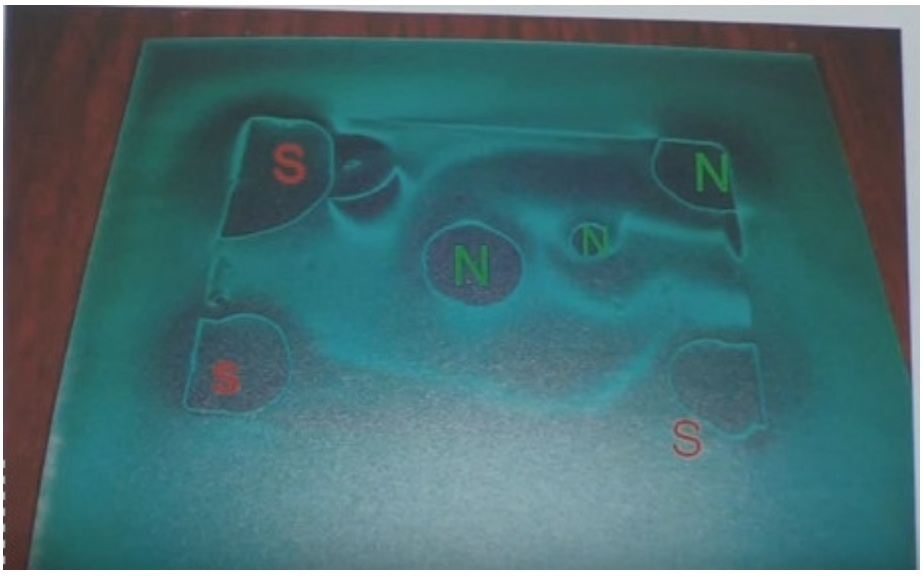

Figure 5. Manelas conditioned magnet

Note the dark areas of the pole faces indicating magnetized regions there. Note also that away from these pole faces the viewing film is predominantly green, thus this area is not well magnetized. ***The important conclusion is that Manelas first demagnetized his magnet (probably by taking it above its Curie temperature) then induced poles onto its surface (probably by bringing stronger NdFeB magnets close to the surface).***