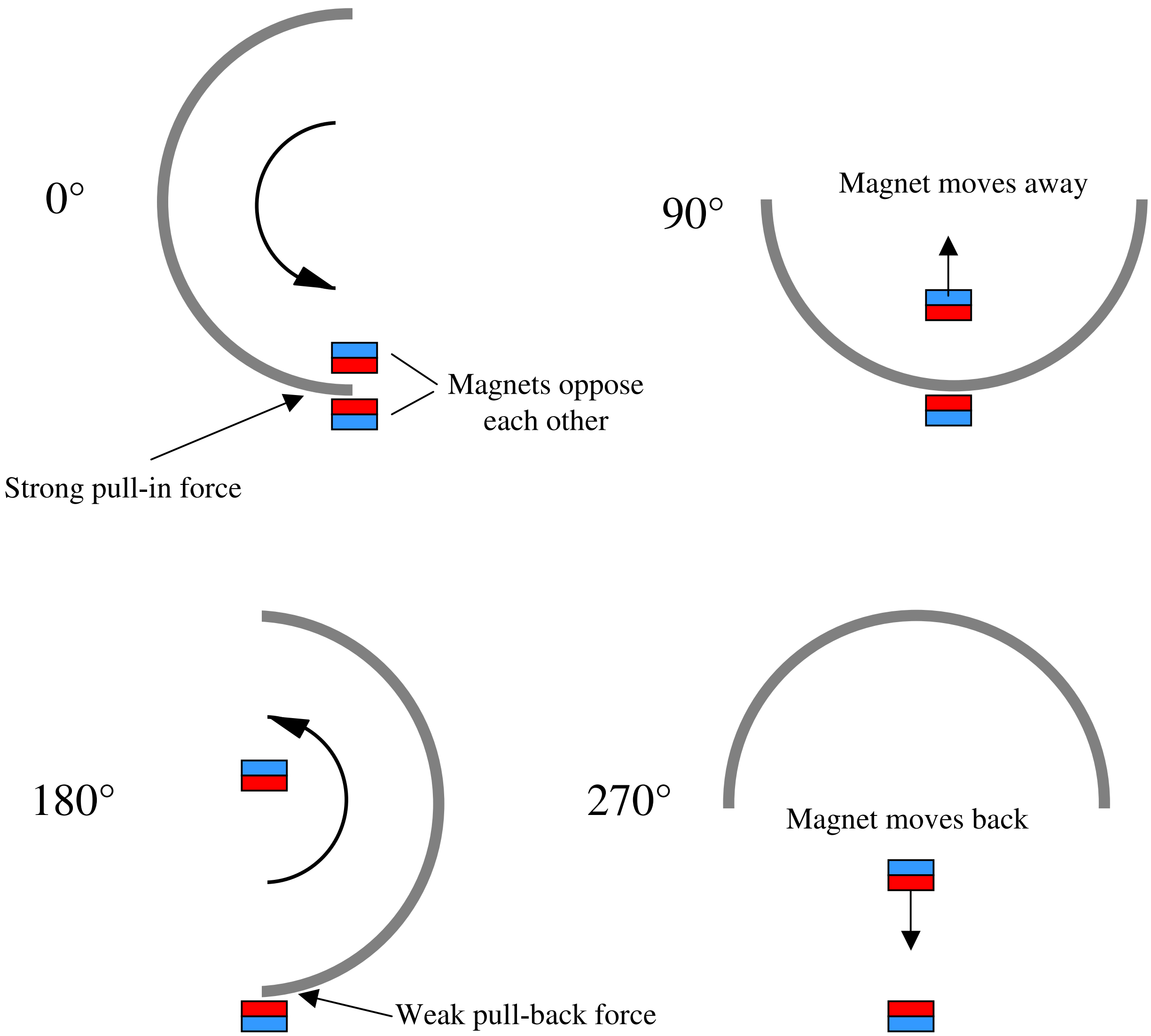
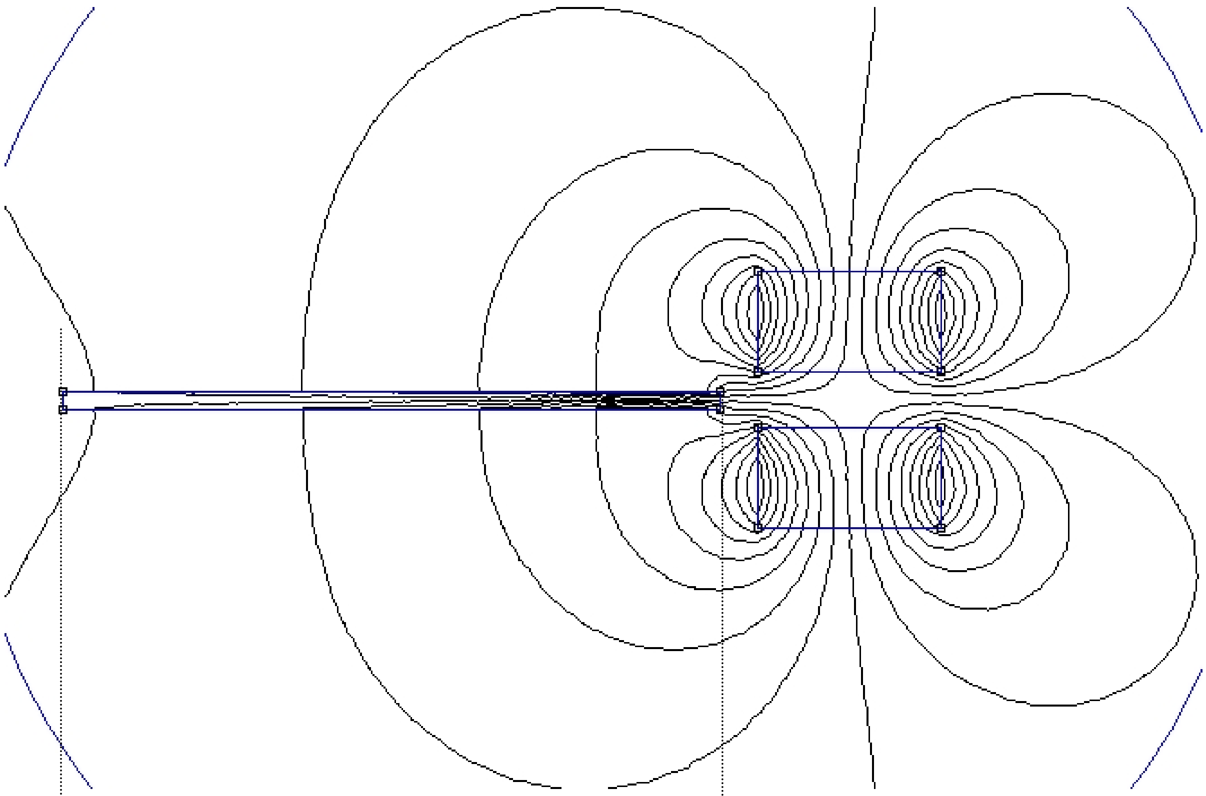
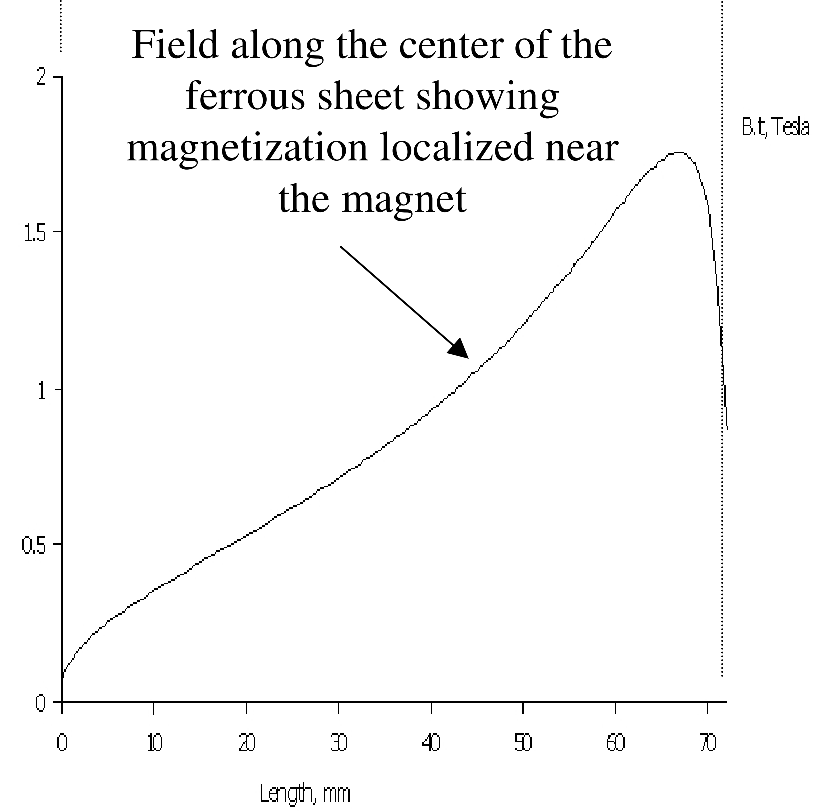
Motor sequence



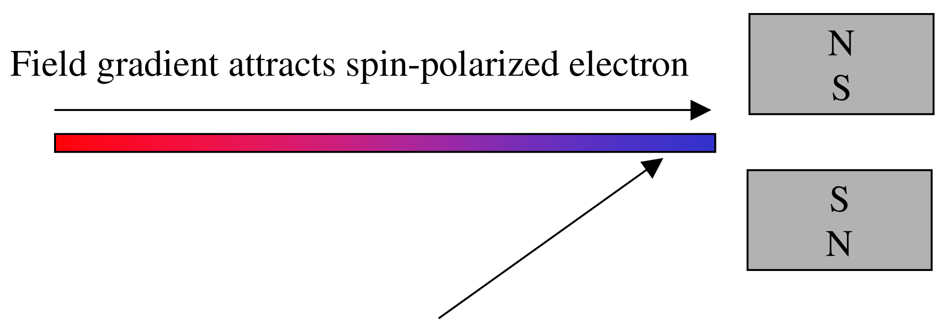
The rotor gains energy because the pull-in force on the rotor is greater than the pull-back force, and that energy is not all lost in performing the magnet movement.

FEMM result showing flux lines

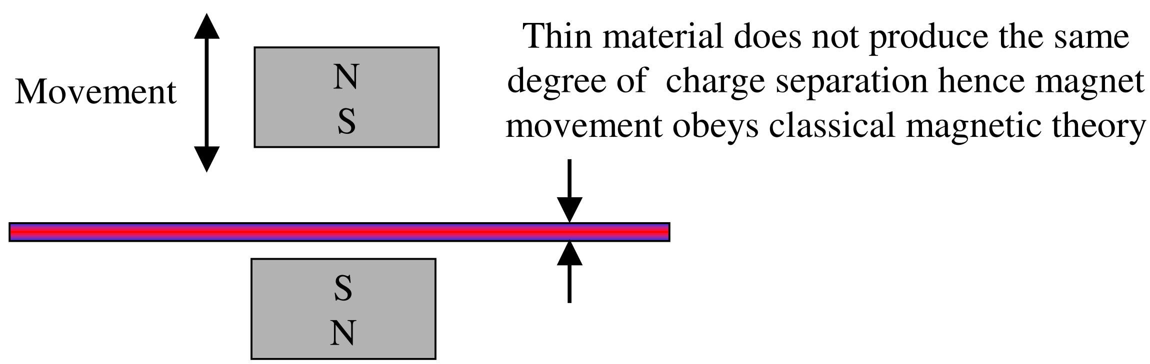




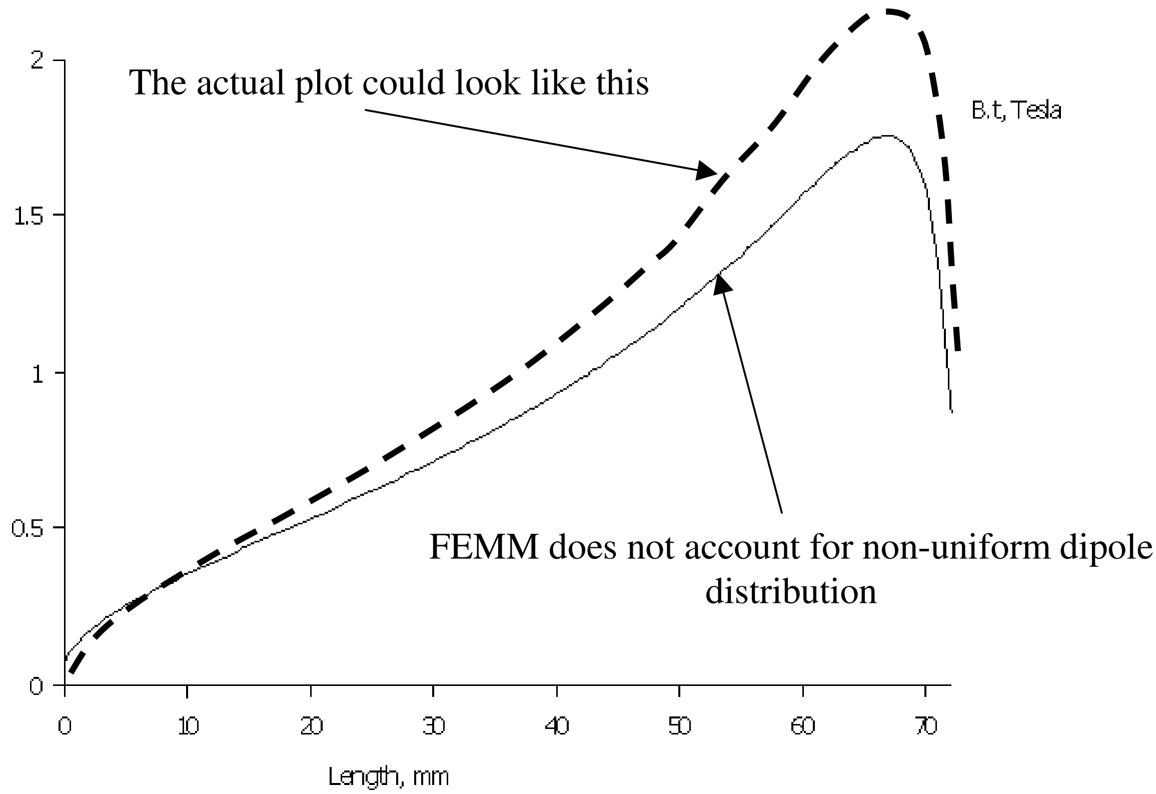
Magnetized Fe is one of the metals of choice for providing spin-polarized conduction electrons. These conduction electrons can be dragged along within the material by a magnetic gradient. Thus within the Fe sheet we can expect to find an induced electric polarization due to this movement of electrons, the end nearest the magnets will be negative while the other end will be positive, The potential difference will be quite small, only microvolts, but that small number is deceiving as it represents a significant variation in the huge charge density of the electrons. That non-uniform distribution of spin-polarized electrons creates a non-uniform distribution of magnetization that is not accounted for in classical magnetic theory.



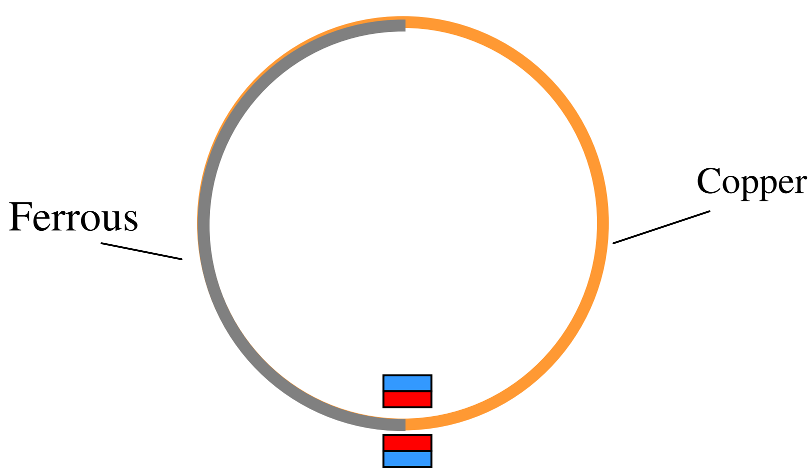
Excess electrons here create greater magnetization than normal magnetic theory predicts and greater than FEMM shows. Pull-in force is greater than expected.



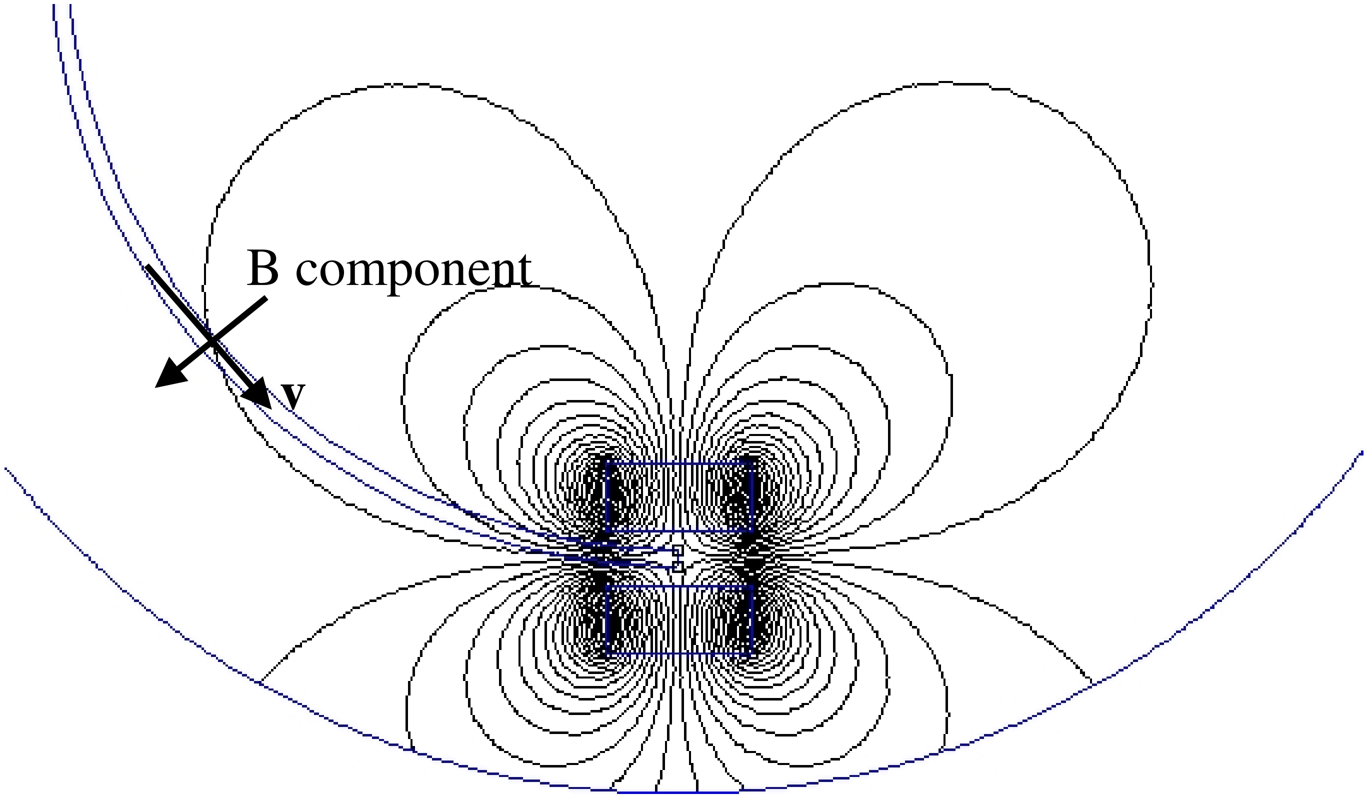
Normally it would be expected that the rotor energy gained is accounted for by the net energy needed to move the magnet out and in. The anomalous magnetization distribution from the spin-polarized conduction electrons could account for the excess seen in Brad’s experiment.



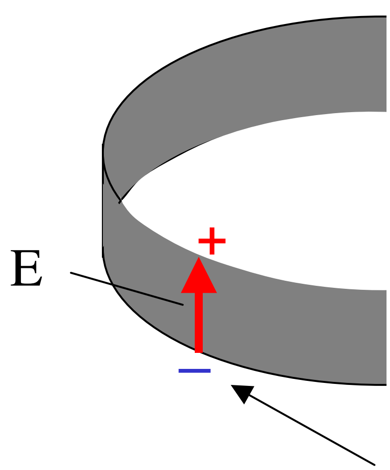
Perhaps one way to check out this theory is to have a copper semi-circle shorting out the ferrous one, then repeat Brad's experiment



If the anomalous gain is lost with the copper short present then we will know that the conduction electrons are playing their part.



v×**B** creates E field across the sheet



Bottom edge gets negative charge hence greater magnetization from spin-polarized electrons. Magnet placement could exploit this anomalous effect.