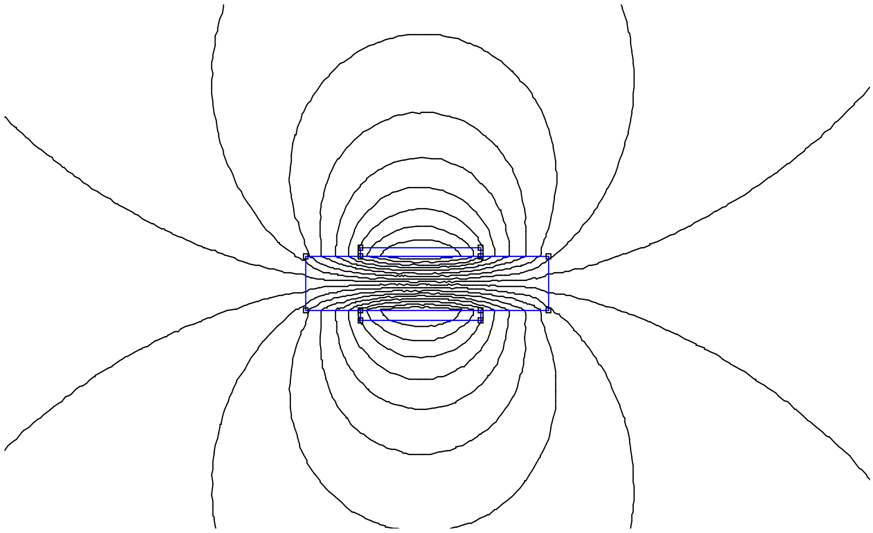
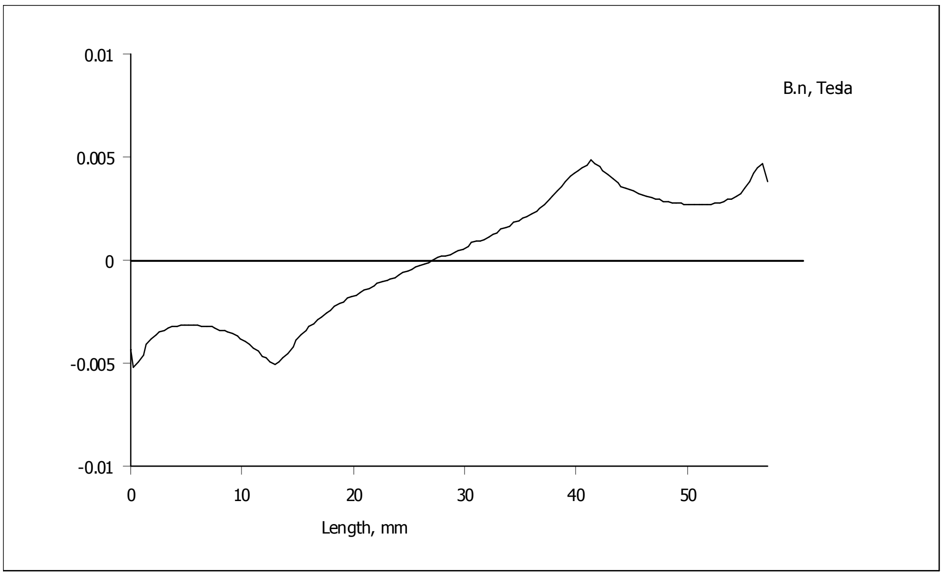
**Some Thoughts on Leakage Flux producing E = v × B Induction**

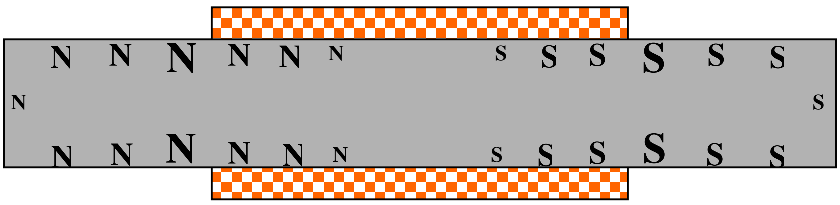
Consider a coil wound onto a ferrite rod but occupying only part of the length of the rod. When the coil is energized the flux will look something like this.



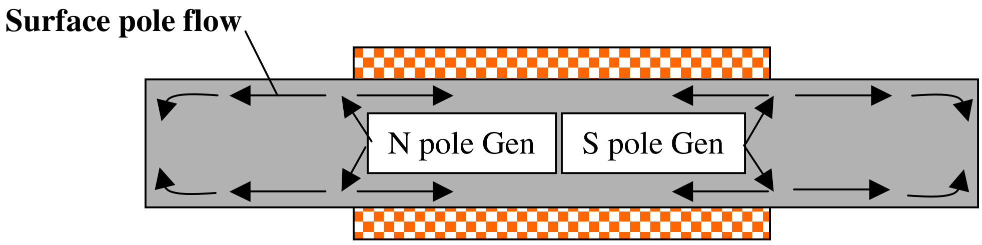
The flux leaking from the surface of the rod has a maximum value just outside the coil extremity. Here is the plot of tangential surface **B** along the rod from end to end.



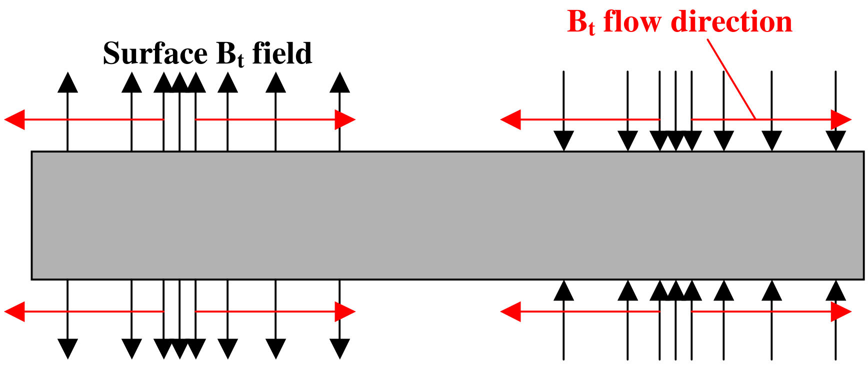

Thus the pole-strength varies along the surface as indicated in the next sketch.




Here the pole strength is illustrated by the font size. When the flux is increasing in value we can consider "pole generators" inside the material pumping poles to the surface as shown in the next sketch.




The Poles spread across the surface hence there is an effective pole flow flowing away from the peak positions as shown. Associated with these pole flows is the surface **B** field that can also be considered to be moving as shown next.




This is interesting because if there is an induction due to $\mathbf{v} \times \mathbf{B}$ then its polarity can be determined by the position of the test coil in which the induction occurs. For a test coil that is within the confines of the drive coil the $\mathbf{v} \times \mathbf{B}$ induction will be of opposite polarity to one outside the drive coil because the velocity direction is reversed. For the classical $d\Phi/dt$ induction the polarity is the same for any position of the test coil. Thus if the $\mathbf{v} \times \mathbf{B}$ induction is real and separate from the $d\Phi/dt$ induction, this offers a simple means for establishing that fact. A simple experiment with small (single turn) test coils in different positions either side of the peak $\mathbf{B_t}$ position should enable the presence of the $\mathbf{v} \times \mathbf{B}$ term to be determined.