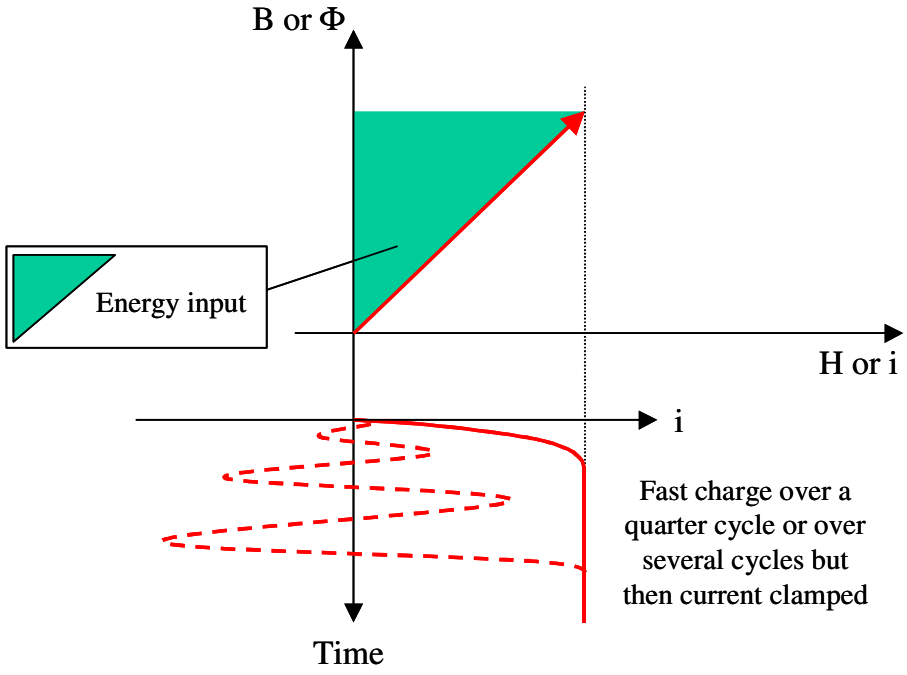
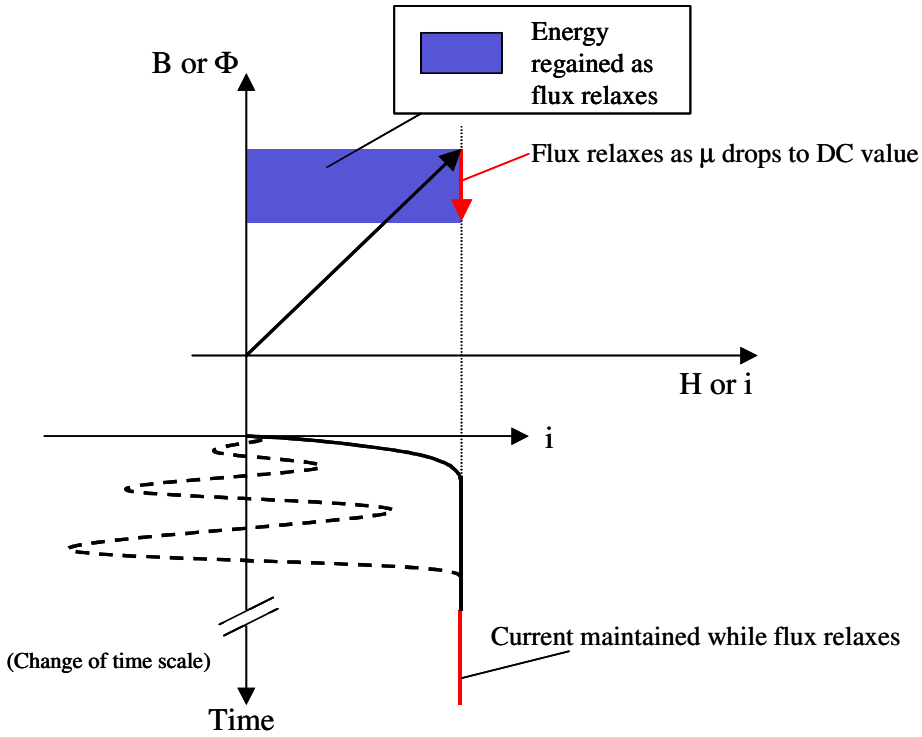
Gaining energy from the permeability peak

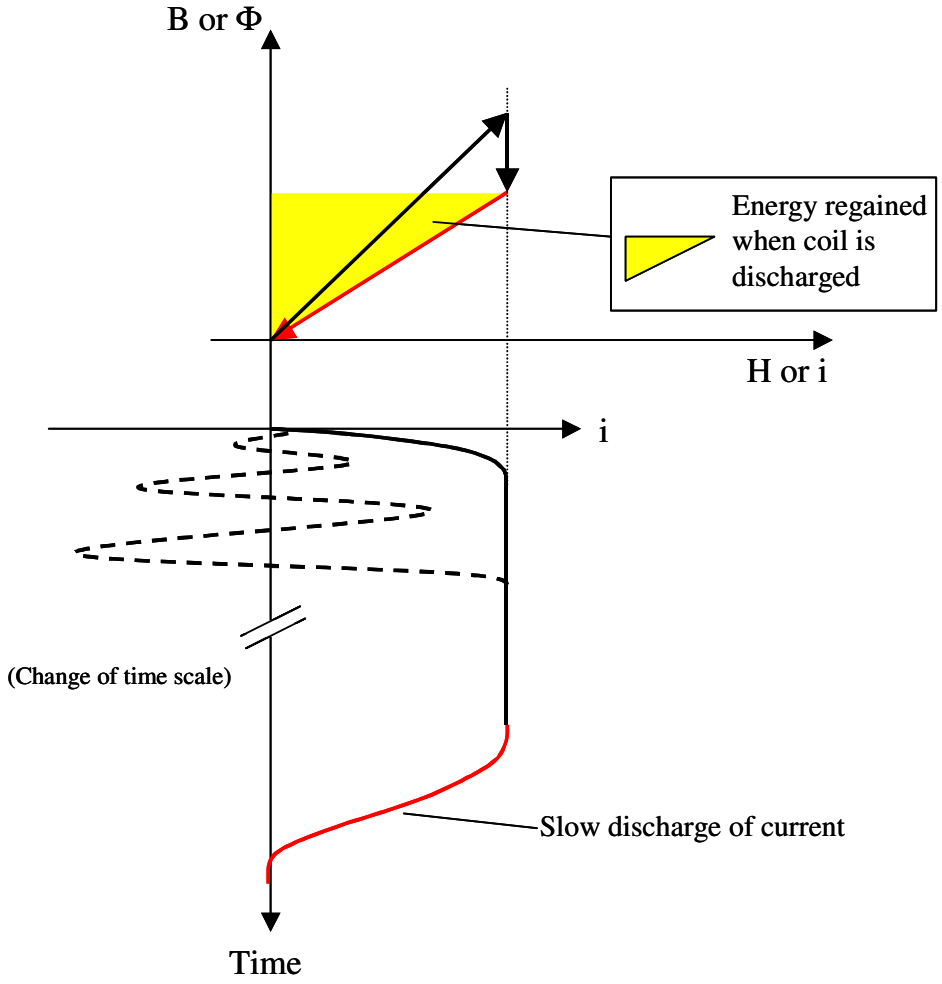
Just to get clear in our minds what is involved in gaining energy from the relaxation from high permeability to low permeability, here are a few pictures. The first one is for a coil that is energized with current quickly, either in a single transient or by a few cycles of RF build-up. The area of the green triangle to the left of the B-H or Φ–i curve denotes the energy that is now stored in the inductor.



If we now hold the current fixed for a period of time much longer that the rise-time, the permeability should relax down to its DC level. Hence the flux will drop, giving a voltage pulse that is of a polarity to feed back energy to the energizing source. Alternatively a pick-off from a second coil wound on the core could be used as an output winding. That energy is depicted by the blue rectangle in the following figure.



Finally the energizing current is switched off so as to decay slowly, yielding another voltage output. The energy releases by that action is shown as the yellow triangle in the next figure.



Comparison of the energy input against energy output shows that the difference is represented by the area of the CW loop taken by the system. Where does that energy come from? Clearly it is a function of the core characteristic, so it comes from the core. Does the core cool down? Or is there some connection with the quantum rules that effect the core characteristic, like ferrimagnetic resonance that is quoted at about 3MHz/Oe (30GHz/T)? Ferrimagnetic resonance is the precession of magnetically active electrons, and if the increase in μ' comes from some synergy between the driving frequency and those precessions then it bodes well for that energy coming from the quantum domain.