Abstract Submitted
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Electromotive force and current in a superconducting solenoid with limited length induced by a bar magnet and a monopole LIANXI MA[1], Blinn College — The magnetic flux, electromotive force, EMF, and current I_{in}, induced by a moving magnetic bar and an imaginary magnetic monopole in a superconducting solenoid of multiple turns and length L, are numerically calculated. The magnetic field of the bar magnet is approximated with the magnetic field along z axis of a solenoid with length l and radius a and current I, while the magnetic field of the monopole is supposed to be inversely proportional to r^2. Calculations show that, for a bar magnet, magnetic flux and I_{in} essentially saturate when the bar moves inside superconducting solenoid, so EMF is zero while I_{in} is constant. EMF is only induced when the bar enters and exits the solenoid and I_{in} is zero after the bar leaves the solenoid. For a magnetic monopole, magnetic flux is discontinuous (from positive maximum to negative maximum) when the it moves through each turn of the superconducting solenoid, but EMF caused by changing magnetic flux is continuous while the EMF induced by the a moving monopole is a delta function (moving monopole produces a ring-shaped E field). The total EMF_{Tot} in solenoid is the superposition of EMF of each turn of coil and the plateau appears. The current I_{in} continues to grow while the monopole leaves the solenoid.

[1]I submitted this abstract to the APS March Meeting 2016, accepted, but didn't get a chance to present it. Is it OK to submit here?

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