

Re: Proof of Ohms law

on the material only and not the applied field E .

Hence there is a relation between the voltage and current(density) and it says they are proportional(For the assumption on the average velocity).

If you apply it to a "rod" or "wire" then you get the macroscopic version which is ohms law.

The main idea here is that applying an electric field produced a motion of charge.. e.g., a velocity of charge and hence v is a function of E . But current is just the motion of these charges and hence ultimately I is a function of E . For many materials its simply proportionate because v is proportionate to E . Its not always the case and of course fails for sufficiently large fields and even depends on frequency(which isn't taken into consideration for this simple analysis). (although the concept can be applied in those cases too by using it as a linear approximation)

That's sort of circular. Maxwell's equations lead to "Ohm's law" only if you assume that carrier velocity is proportional to field strength in certain materials. So you get Ohm's law by assuming Ohm's Law.

Maxwell didn't actually know what a charge carrier is. He died in 1879.

John

Then how about this rationale: Ohm's law has been applied several gazillion times and it always worked. The number of events where it reportedly hasn't jibed were zilch, I assume. Now in the medical world that would be considered bullet-proof clinical evidence.

No conductor exactly follows Ohm's Law, so it isn't a law. Lots of conductors are seriously nonlinear. It only works for materials where

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it works, again circular.

There are solid conductors that have bulk negative resistance.

John

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