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Role of radius on magnetic field of a solenoid of finite length revisited

S N MAITRA

Retired Head of Mathematics Department
National Defense Academy, Khadakwasla, Pune-411023

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Abstract : The role of radius on the magnetic field of a solenoid at an axial point is vividly studied. First, it is established that with given length of a solenoid its magnetic field at given axial point outside the solenoid has a maximum with respect to an optimum value of its radius. Variation of the magnetic field at any axial point inside/outside the solenoid with its radius with given surface area/ volume of the solenoid is also studied. Magnetic field of a solenoid of considerably large length at any axial point is formulated in two different cases and the curve depicting the distribution of the axial magnetic field and radius is found to be a parabola.

[Full Paper]