

Physics Presentation

Name- Atul Prakash

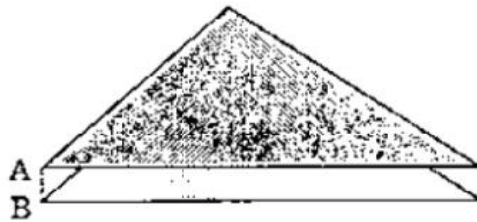
Batch- 5

Reg.No. - 20211252

Date- 29.06.2022

Question:-

Two parallel equilateral triangular plates are placed overlapping each other very close to each other. The plates carry uniformly distributed unlike charges of equal moduli. Deep inside the region between the plates, electric field is uniform but near the edges, it becomes non-uniform. If modulus of electric field deep inside the plates is E_0 , find modulus of electric field at the midpoint of line AB. What happens if the plates have the shape of a regular pentagon?



Solution- since, the plates are very close, a point in the deep region will be analogous to a point near an infinite plate (system is indifferent).

Part 1:- To find electric field at the mid- point of AB

The electric field due to the above positive charged plate and lower negative charged plate is shown in the figure1. The resultant electric field will be downward. Let's, assign this value as E .

The most plausible way to find the solution is to draw a symmetric distribution as shown in the figure2.

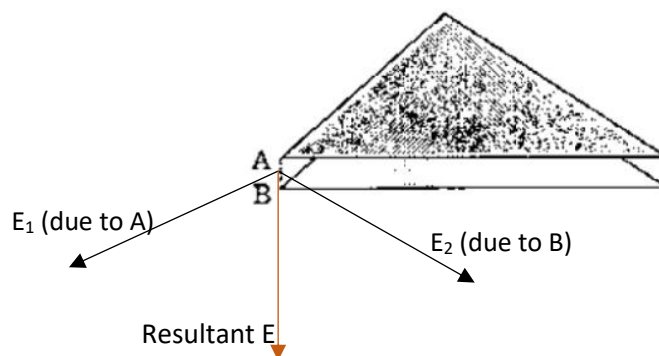


fig.1.

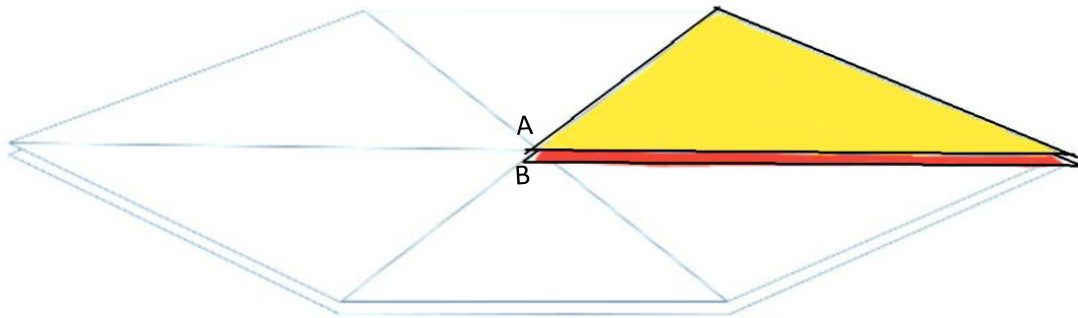


fig.2.

By the principle of superposition, the electric field at the mid-point of AB is $6E$ (considering all the 6 plates in fig.2.). As the electric field distribution in the deep is E_0 , equating the expression below

$$6E = E_0$$

$$\Rightarrow E = \frac{E_0}{6}$$

This electric field is in the downward direction and its magnitude is $E_0/6$.

Part 2- Using similar 'symmetric arguments of electric field distribution' part 2 can be solved.