

# Capacitor charge per unit length

A capacitor is a device which stores electric charge. Capacitors vary in shape and size, but the basic configuration is two conductors carrying equal but opposite charges (Figure 5.1.1). Capacitors have many important applications in electronics. Some examples include storing electric potential energy, delaying voltage changes when coupled with

Capacitors are physical objects typically composed of two electrical conductors that store energy in the electric field between the conductors. Capacitors are characterized by how much charge and therefore how much electrical energy they are able to store at a fixed voltage. Quantitatively, the energy stored at a fixed voltage is captured by a quantity called capacitance ...

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In a cardiac emergency, a portable electronic device known as an automated external defibrillator (AED) can be a lifesaver. A defibrillator (Figure (PageIndex{2})) delivers a large charge in a short burst, or a shock, to a person's heart to correct abnormal heart rhythm (an arrhythmia). A heart attack can arise from the onset of fast, irregular beating of the heart--called cardiac or ...

where our differential line element  $dl$  is  $dx$ , in this example, since we are integrating along a line of charge that lies on the  $x$ -axis. (The limits of integration are  $0$  to  $L$ , not  $-L$  to  $+L$ , because we have constructed the net field from two differential pieces of charge  $dq$ . If we integrated along the entire length, we would pick up an erroneous factor of 2.)

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(b) If the capacitor is charged to 125 V, what will be the charge per unit length  $\lambda$  on the capacitor?  $\lambda$  is defined to be the charge per length, so  $\lambda = Q/L$ . For any capacitor,  $C = Q/V$  so  $Q = CV$  and ...

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Cylindrical Capacitor. For a cylindrical geometry like a coaxial cable, the capacitance is usually stated as a capacitance per unit length. The charge resides on the outer surface of the inner conductor and the inner wall of the outer conductor. The capacitance expression is. Show: For inside radius  $a = m$ , outside radius  $b = m$ , and dielectric constant  $k =$ , the capacitance per ...

The capacitance (C) of a capacitor is defined as the ratio of the maximum charge (Q) that can be stored in a capacitor to the applied voltage (V) across its plates. In other words, capacitance is the largest amount of charge per volt that can be stored on the device:

The amount of charge a vacuum capacitor can store depends on two major factors: the voltage applied and the capacitor's physical characteristics, such as its size and geometry. The capacitance of a capacitor is a parameter that tells ...

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difference between them is  $V$ , and the charge per unit length on the inner cylinder is  $+ C m^{-1}$ , and on the outer cylinder is  $C m^{-1}$ . We have seen (Subsection 2.2.3) that the

When used in a direct current or DC circuit, a capacitor charges up to its supply voltage but blocks the flow of current through it because the dielectric of a capacitor is non-conductive and basically an insulator. However, when a capacitor is connected to an alternating current or AC circuit, the flow of the current appears to pass straight through the capacitor with little or no resistance ...

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