

# Why is the power line always sagging?

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1. We can still survive after being struck by lightning, why?
2. Why are there three plugs and three legs in the power plug?

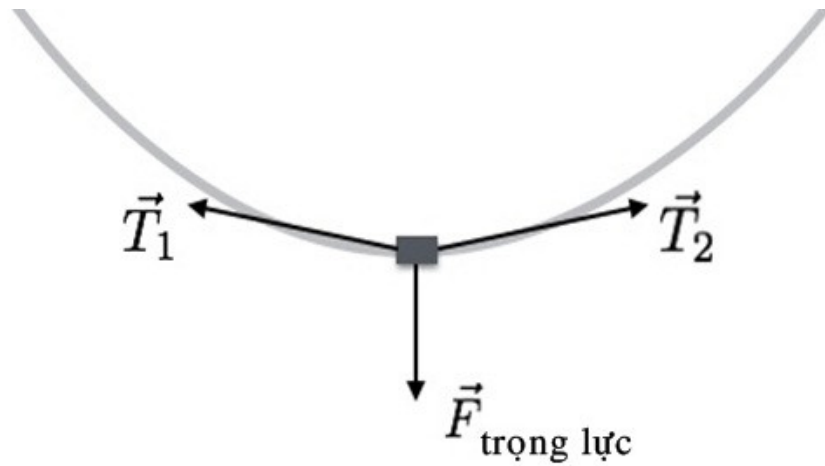
The reason is because the power line is mass and attracted by the gravity of the Earth.



Wires when installed on electric poles are always dimmed.(Photo: Wired.)

Because the electric wire has mass, gravity appears on it. Suppose we hang the ends of an electric wire into two points horizontally, then it is in equilibrium and has the sum of the forces on the wire to be equal to the vector. This means that the sum of forces at the ends of the wire must be equal to the magnitude of the gravitational force.

So with a small part of the wire, what will the force act on? Suppose we can isolate a small piece of wire near the middle position, where the power cord when installed on the dimple poles the most. Since this part of the wire is also in equilibrium, the total force vector acts on the piece of wire with the vector.



3 forces act on the power cord.(Photo: Wired.)

The power line when installed must be affected by 3 forces. Gravity is directed downwards, this force depends on the value of the gravitational field and the amount of wire. The remaining two forces are the tension  $T$  of the rope pointing upwards to keep the power cord stationary, located in the tangent position to the wire deflection line.

We find that, in the three forces that the power line is affected, no force is directed upwards to balance the gravity downward so it must be dimmed.

Even if the electrician uncle has increased the tension of the power cord to reduce deflection, it will never be completely horizontal.

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