Strays – Then and now

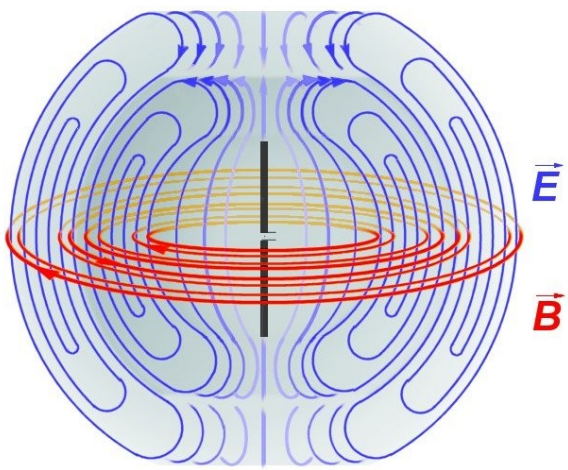
In case the above title leads you to believe we're discussing something reminiscent of the *good-ole days*, let me help you focus your nostalgia on something only remotely related, ***time differences***. And I'm not talking about the Daylight Saving kind either, because that topic alone would probably draw the torch-and-pitchfork mob at my doorstep the day following publication. From the early days of when mankind began to reckon the time of day, it soon became apparent that one time measurement of great interest was ***the passage of time***.

I love blueberry pie, and I even know how to make one. The only problem I typically ever encounter when I attempt the feat, however, is my interpretation of the amount of time that's required to perform the baking part of the task, versus the actual time that I allow the creation to remain in the oven at the requisite temperature, assuming the raw ingredients begin their heated journey at room temperature. Whether it's the amount of time something requires, or the amount of time that an event transpires, either is often measured by the difference between the ending time and the starting time, known as the time differential, ***Δt***.

Relevance

The world of amateur radio is built on the very principles that depend heavily on things that change through time. While permanent magnets can be fun to play with, our radio sphere can only occur using magnetic fields that change with time. The following is one of Maxwell's equations, known technically as the *Maxwell-Faraday Equation*:

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$



In essence, *a time-varying magnetic field always accompanies a spatially-changing electric field that changes at the same time*. From this equation, it should be obvious to the casual observer (just kidding) a magnetic field (***B***) that changes with time (**t**) produces an electric field (***E***) that also changes with time and space, the very basis of radio waves in a single formula. The corollary to this is that if the magnetic field is constant, like with a permanent magnet, there will be no time-varying electric field, and therefore no radio waves. But you knew that.

And you likely also knew that electricity takes a certain amount of time to travel down a conductor. And since it's varying in intensity as it travels, it produces a time-varying magnetic field outside it. And if that varying time happens to match the speed of electrical current through the conductor (velocity factor), you have a recipe for a possibly effective antenna.

What might be surprising, however, is that two separate electromagnetic ("radio") signals can originate from a single source, yet arrive at different times at the same destination. This can occur when part of the signal is reflected off a hillside or the side of a large building, for example. The ensuing *multi-path* pair results in the signals being received at slightly different times out-of-phase (out-of-sync) with each other, potentially resulting in distortion and even cancellation of each other.

So, quite a lot of what we amateurs deal with involves the time differential. As for my blueberry pie, my family might disagree, but I believe I've only exceeded the required baking time once that I'm aware of. In any case, we seemed to have survived the ordeal sufficiently to allow me to continue my life's journey.

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