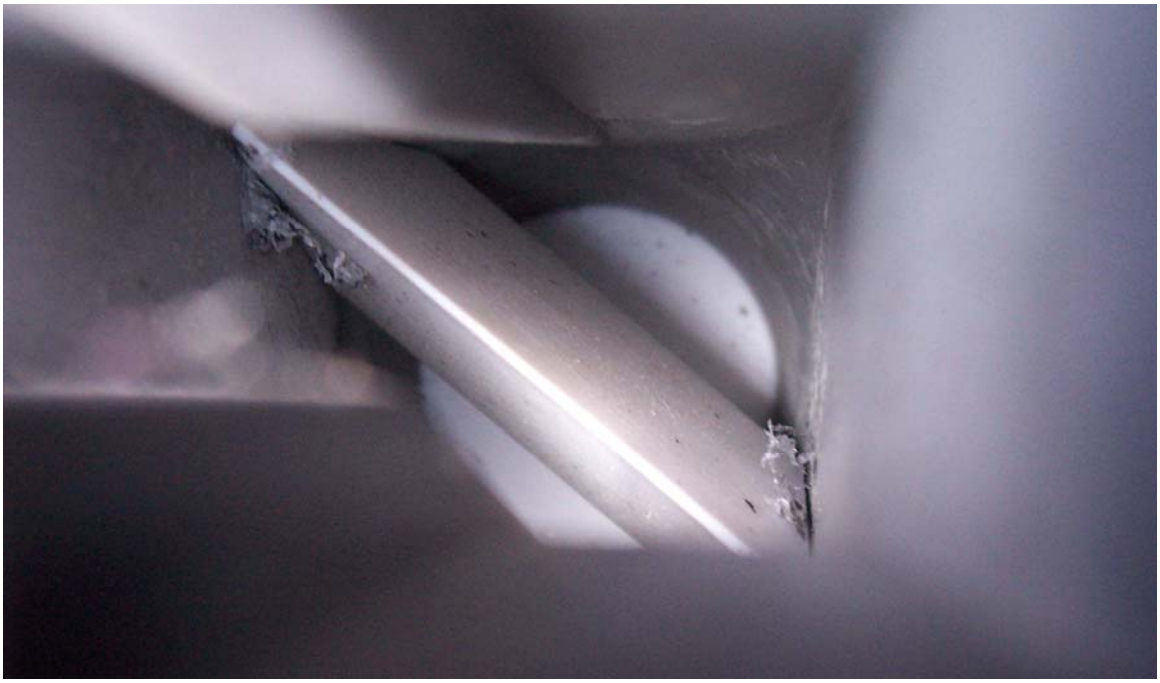
Circular Polarization de WA5VJB



It was fun getting a fairly good photo of a dielectric slab inside a section of ridged waveguide.

One common way to generate Circular Polarization is to put a slab of dielectric/plastic at a 45 deg angle to the wave. As many of you know, I have a very large library of antenna textbooks, and while many talked about this CP technique, NOT ONE OF THEM said if you got Right or Left Hand Circular Polarization!

So I asked Dick, K2RIW, who is not known for short answers!

Kent,

In the way you worded the question you have a triple ambiguity.
1. Is the probe at 3, 6, 9, or 12 o'clock (rear view)?
2. Is the plastic slab tilted 45 degrees to the right or left?
3. Is CW or CCW defined by the IEEE or Classic Physics?

The IEEE says that if the back of the antenna is touching your chest, and if the instantaneous E-filed that is being launched is rotating in a CW manner (when viewed from the rear at a constant Z-plane location), than the wave is CW.

The plastic sheet slows down the propagation of the wave that is parallel to it.

If your probe is at 12 o'clock, and the plastic sheet is tilted 45 degrees to the right (all from the rear view), the horn is launching a CW wave (by IEEE definition) if the plastic is the minimum length to do the job (90 degrees of delay), in the Z direction.

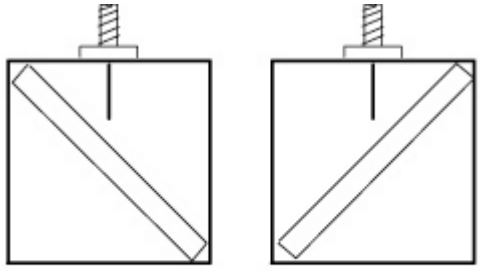
If the plastic is 3 times as long (270 degrees of delay), the wave would be CCW.

The 12 o'clock probe launches a Vertically Polarized wave. By Vector Decomposition you could say half of the wave is slanted 45 degrees to the right (at 1:30 o'clock), and half of the wave is slanted 45 degrees to the left (at 10:30 o'clock). Add those two waves together and you re-get a purely Vertically Polarized wave (at 12:00 o'clock).

The plastic sheet delays (by 90 degrees in time) the de-composed part of the wave that's 45 degrees to the right (at 1:30 o'clock), when compared to the de-composed part of the wave that's 45 degrees to the left (at 10:30 o'clock). The 10:30 wave comes out first, and the 1:30 wave comes out 1/4 of a cycle later. That's means you're generating a Polarization Arrow that sweeps from 10:30 to 1:30, which is a CW sweep.

Lots of smart people have a lot of trouble figuring out Circular Polarization senses.

73 es Good DX, Dick, K2RIW



So look into the back of the feed , where the waveguide probe would be mounted and with the probe position vertical. If the slab looks like it is 'falling' to the Left, then the feed is LHCP, 'falling' to the Right, then the feed is RHCP. If you want to look down the throat of the feed, then reverse LHCP and RHCP. Yea, confusing, so look down waveguide from the back.

With two groups defining Circular Polarization the opposite way, and that your CP reverses sense after if reflects (mirror images) off a dish, no wonder so many microwave EME stations are running opposite CP's.