When we do AC Simulation, we are able to analyze the circuit by using Voltage probe and Current probe.

When we do the S-parameter Simulation, then there is no way to analyze the circuit. Voltage and Current probes cannot be used in the S-parameter Simulation.

Why would it make sense to analyze the circuit in the S-parameter Simulation? And how to do that? Here is my answer. I need to know the power waves (forward wave "a" and reflected wave "b") in order to calculate voltages and currents at each point of the device under test. This also helps calculate the power that is consumed by the device. Do be able to do this, there should be a capability to measure the power waves in the S-parameter simulation.

What do I suggest? I suggest we introduce "Power Wave Probe". The probe would function in the same wave as Current Probe. That is, it would be inserted in series just as the Current probe.

The device would look something like this:

or
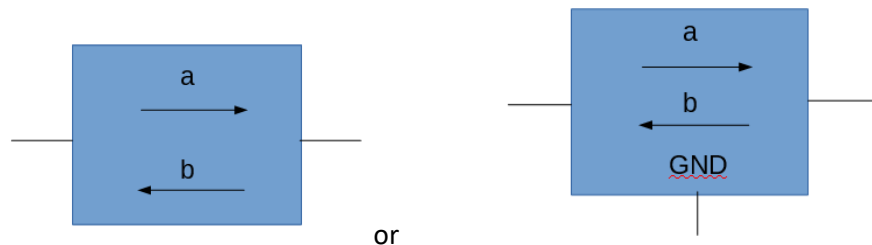
Clearly, this device would be directional. Power wave "a" would be directed into the device under test. The schematic may contain more than one power port, for example, three power ports. In this case the "Power Wave Probe" would produce three values of "a" and three values of "b". That is one "a" and one "b" per each power port excited.

The schematic would look something like this:
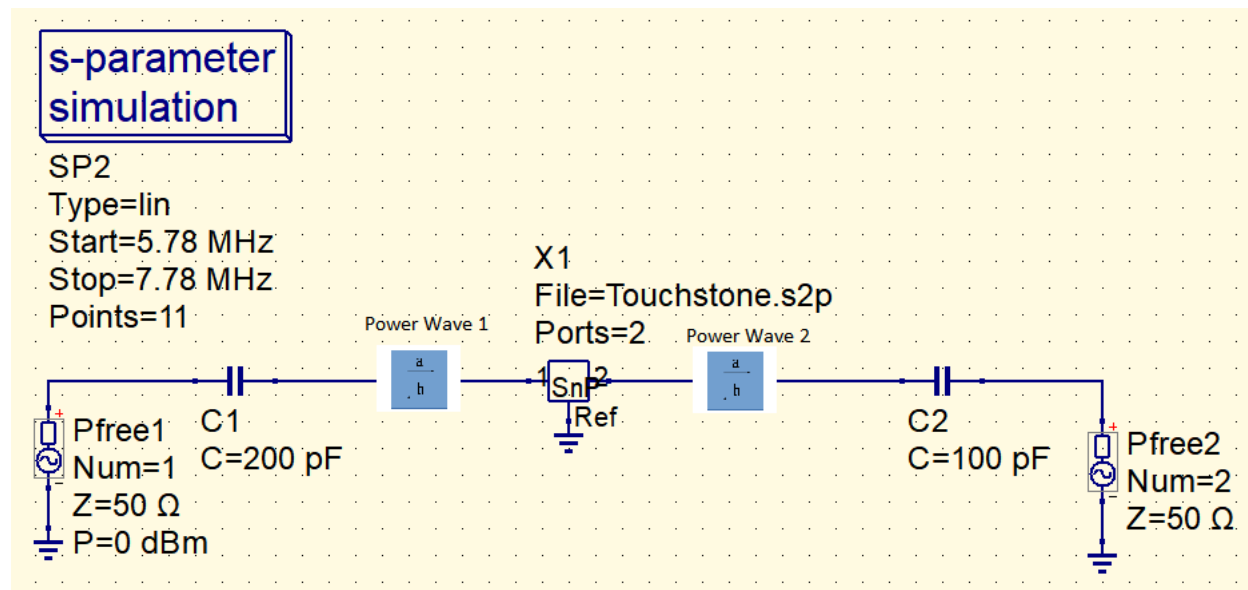
Theoutput of the simulation would be somethis like this:

Power wave 1:

"a"=(0.234-j0.463, 0.543+j0.586)   (two values because there are two power ports)

"b"=(0.4324-j0.123, 0.321+j0.987)   (two values because there are two power ports)

These numbers are completely made-up.

If I can measure power waves "a" and "b", then I would be able to calculate voltages and currents by extracting those from the following definitions of "a" and "b".

$$a = \frac{V+Z_0 I}{2\sqrt{Z_0}} \text{ and } b = \frac{V-Z_0 I}{2\sqrt{Z_0}}$$

The power waves are also convenient to calculate the incident and reflected power:

$$P_{inc} = \frac{|a|^2}{2} \text{ and } P_{refl} = \frac{|b|^2}{2}$$

Would you have interest to implement the "Power Wave" feature for S-parameter simulation?