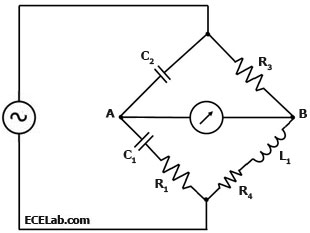


Owen Bridge



If VA = VB:

Let’s set this to be the case at temperature T0.

Now let’s investigate how the voltage changes as the temperature varies.

Now invoke the temperature dependence:

But we know from the condition we set up:

Denominator:

Assuming is small and is small:

Now we can find these in terms of , and find the sensitivity versus …

First half of denominator:

Other half of denominator:

Combined denominator:

Plug this back in as the denominator:

Imaginary numerator:

Now, what if = 1?

Now, what if ?

Solve for C2…

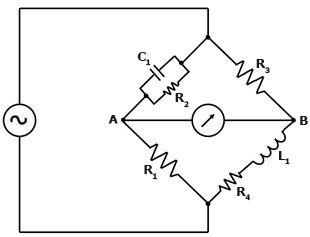
Now that we’ve found a solution, what does the function look like?

Somehow, the bridge doesn’t seem to be balanced, VABimag is not zero at dT =0. And yet, here it sayu it should be. What is different about the condition?

Balanced arm impedances?

<-not possible! Negative capacitance.

Maxwell Bridge Time!



This is a bridge that I might be able to see working…

Balanced bridge:

Match imaginary and real parts:

Let’s now target maximum sensitivity. First, use intuition to guess the condition that makes this possible:

Match imaginary and real parts:

Using what we got from the condition for balance:

We now have four equations and four unknowns. So we ought to be able to solve for every component.

This is a quadratic… two solutions:

This does seem unsolvable. Clearly we would need the positive branch… but this will probably still result in a negative resistance.

Okay, let’s try an alternate route, by taking the actual sensitivity and setting its derivative to zero.

Denominator:

Numerator:

Full equation:

Numerator:

Imaginary part:

Sensitivity: