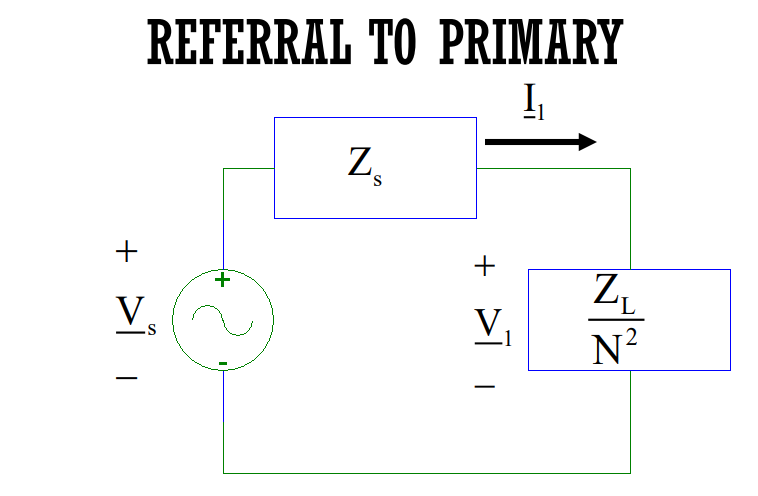
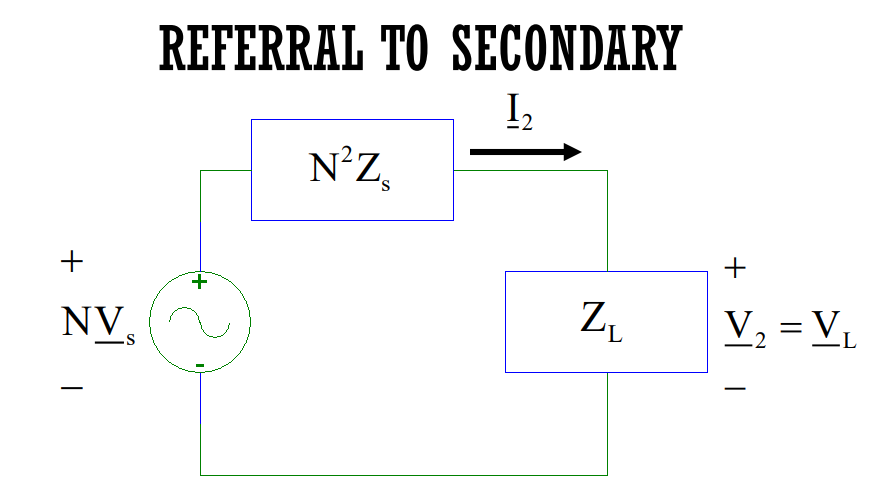
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Complex Numbers** | | | | | |
|  | | | | Rectangular form**:**    Polar form:    Rectangular to polar      Polar to rectangular | |
| **Euler’s Law:** | | | | | |
| **Mathematics with complex number** | | | | | |
| **Addition/Subtraction – Rectangular form**      Complex conjugate | | **Multiplication/Dvision – Rectangular form**      Complex conjugate | | | |
| **AC Steady State signals** | | | | | |
| **Time domain signals**    Ao – amplitude  ω – radial frequency, 2πf  ϴ – phase | | **Phasor signals**    Ao – amplitude  ϴ – phase | | | |
| **(Rectangular form) (Phasor form)** | | | | | |
| **Impedances – Laplace domain (zero initial conditions)** | | | | | |
|  |  | | | |  |
| **Impedances – AC steady state** | | | | | |
|  |  | | | |  |
| ***Impedance, Z [Ω], properties have the same characteristics as resistance***  ***In series add, In parallel, inverse relationship,*** | | | | | |
| ***Admittance, Y [mho], properties have characteristics that are the ‘inverse’ of impedance***  ***In parallel, add, In series, inverse relationship,*** | | | | | |
| **AC Steady State Power** | | | | | |
| S – Complex power  P – Real power, [W]  Q – Reactive power, [VAR]  **|S|** –Apparent Power, [VA] | | Using Ohm’s Law relationships for impedances (Z)    If using VRMS2 version of equations also divide by |Z| (phasor form) \*cos or sin θ OR must use complex conjugate of Z (rectangular form) | | | |
| Capacitive reactance is negative (Q < 0)  Inductive reactance is positive (Q > 0)  Power produced by the source(s) is equal to the sum of the power produced/stored for each impedance in the circuit | | Power factor – a metric over how efficient power consumption/production appears to be  0 < power factor < 1  Power factor = | | | |
| **Power Triangle** | | | | | |
| **Ideal Transformers** | | | | | |
| Np : number of windings on the primary  Ns : number of windings on the secondary | | Primary: source side of the transformer  Secondary: load side of the transformer  The winding ratio,  Voltage relationship,  Current relationship, | | | |
|  | | Refer to secondary (voltage source):    Refer to secondary (current source):    Refer to primary: | | | |
| **Mutual Inductance** | | | | | |
|  | | | The Tee model for coupled inductors represents an equivalent circuit.  M is the mutual inductance, the coupling between the two inductors.    where k is the coupling coefficient  0 < k < 1 | | |
| **Student Requested Add-ons** | | | | | |

A table of mathematical equations

Description automatically generated