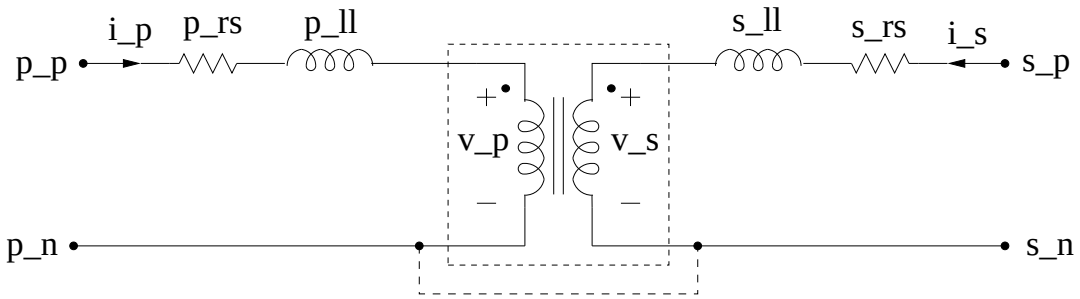
xfmr_level3_1ph.ece



Attributes

```
  mainnodes: p_p p_n s_p s_n
  outvar:
+   v_p=v1_of_x0
+   v_s=v2_of_x0
+   i_p=cur(p1)_of_x0
+   i_s=cur(p2)_of_x0
  rparms:
+   p_l=1m
+   s_l=1m
+   k=1
+   p_rs=1m
+   p_ll=1n
+   s_rs=1m
+   s_ll=1n
```

Description

`xfmr_level3_1ph.ece` includes a transformer model with coil series resistances and leakage inductances taken outside (see figure). `p_xxx` and `s_xxx` are used to denote node and parameter names on the primary and secondary side, respectively. For example, `p_l` and `s_l` are self inductances on the primary and secondary side, respectively. The parameter `k` is the coupling coefficient (i.e., $M = k\sqrt{L_p L_s}$). Currents and voltages shown in the figure are made available as output variables. The equations incorporated for the transformer (dashed rectangle in the figure) are:

$$V_p = L_p \frac{di_p}{dt} + M \frac{di_s}{dt}\,, \tag{1}$$

$$V_s = L_s \frac{di_s}{dt} + M \frac{di_p}{dt}\,. \tag{2}$$

The turns ratio for the transformer is $N_p/N_s = \sqrt{L_p/L_s}$. Note that, by assiging suitably small values to the coil series resistances and leakage inductances, and suitably large values to the self inductances, this element can be used as an ideal transformer.

The dashed connection between the two sides (see figure) should be made *externally* in the circuit file if there is otherwise no connection between the two sides. This is required because the circuit as a whole can have only one reference node. If the two sides are completely isolated, a part of the circuit will remain floating, leading to a singular matrix.

The dashed wire does not change the circuit behaviour since it does not carry a current, there being no return path.

AC behaviour is not implemented.