

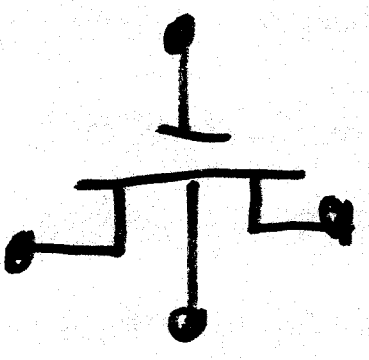
Device Modeling

Goal: Obtain a mathematical relationship between the port variables of electronic devices.

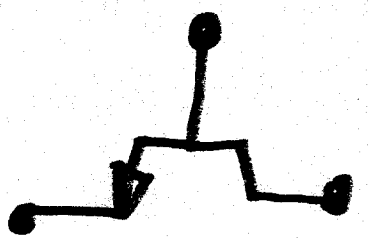
Consider:



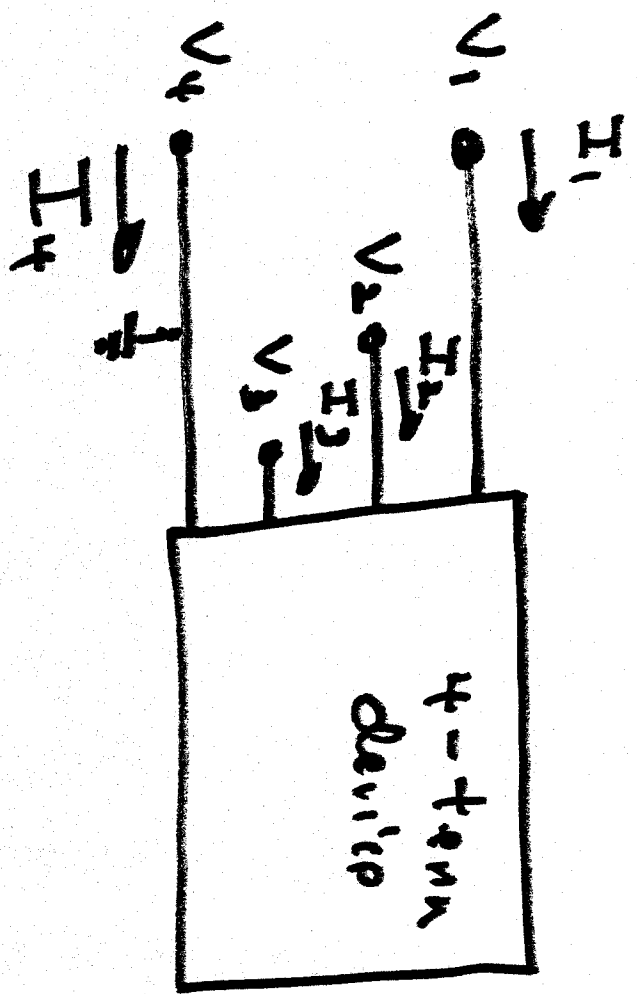
2-terminal



4-terminal



3-terminal

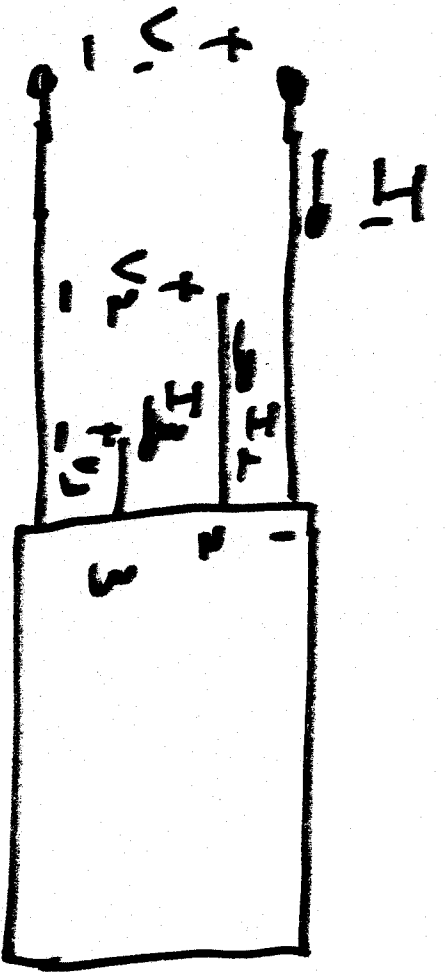


But! $I_1 + I_2 + I_3 + I_4 = 0$

\therefore only 3 of the currents need be modeled

likewise, by KVL

only 3 of the voltages need be modeled.



Note: There are 6 port variables that characterize the device.

$$\{V_1, V_2, V_3, I_1, I_2, I_3\}$$

Any 3 of those 6 variables can be selected as independent variables and the remaining 3 will be dep. variables.