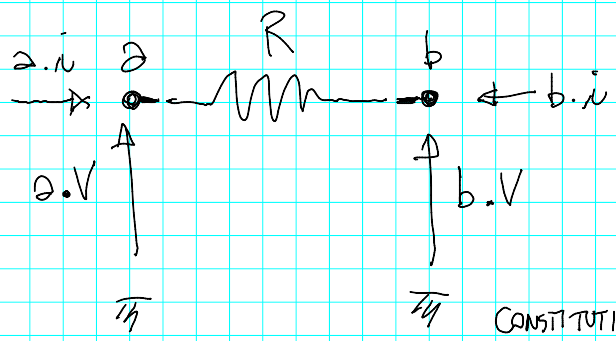
07/03/2019

1



IRRESPECTIVELY of BCs

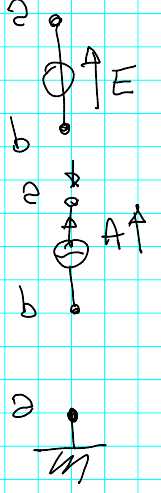
CONSTITUTIVE EQUATIONS
$$\begin{cases} a.i + b.i = 0 \\ a.v - b.v = R \cdot a.i \end{cases}$$

4 VARS: a.v b.v a.i b.i

2 EQS

not closed

2



$$\begin{cases} a \cdot i + b \cdot \dot{i} = 0 \\ a \cdot v - b \cdot \dot{v} = E \end{cases}$$

$$\begin{cases} a \cdot \dot{i} + b \cdot i = 0 \\ a \cdot i = -A \end{cases}$$

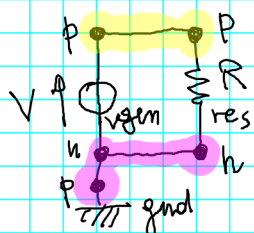
$$a \cdot v = 0$$

2E 4V

2E 4V

2V $a \cdot v$, $a \cdot i$
1E

Simple circuit



connector pin { voltage v / Flow current i

CONST EQ 10V 5E

$vgen.p.i + vgen.n.i = 0$
$vgen.p.v - vgen.n.v = V$
$res.p.i + res.n.i = 0$
$res.p.v - res.n.v = R \cdot res.p.i$
$gnd.p.v = 0$

vgen, res, gnd

CONNECTION EQUATIONS 0V 5E

connect(vgen.p, res.p)
- $vgen.p.v = res.p.v$
- $vgen.p.i + res.p.i = 0$

connect(vgen.n, gnd.p)
- $vgen.n.v = res.n.v$
- $vgen.n.v = gnd.p.v$

connect(res.n, gnd.p)
- $vgen.n.i + res.n.i + gnd.p.i = 0$

Resistor

pin p, n
heat port H

equation

$p.i + n.i = 0$

$p.v - n.v = R \cdot p.i$

$R = R_0 + \alpha (T - T_0)$

$H.T = T$

$C \cdot der(T) = R (p.i)^2 + H.Q\_Flow$

connector heat Port

Temperature T
Flow Power Q_Flow

$u = L \frac{di}{dt}$

$i = L \int u$