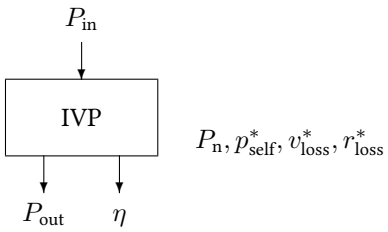
Block IVP

The IVP block simulates inverter losses.





Name	IVP
Function	se0008
Inputs	1
Outputs	2
Parameters	0 . . . 4
Strings	0 . . . [1]
Group	S

Inputs

1 DC power P_{in} / W

Outputs

1 AC power P_{out} / W
2 Efficiency η

Parameters

1 Nominal DC power P_n / W. If no parameter is given, PARAMS(1) . . . PARAMS(4) are read from the inverter database (data/pv/pv_inverters.fb.bin), for the inverter STRINGS(1).
2 Normalized self consumption p^*_{self}
3 Normalized voltage losses v^*_{self}
4 Normalized ohmic losses r^*_{loss}

Strings

1 Product ID, e. g., iv0618 (legacy database) or SMA America: SB50-1SP-US-41 {240V} (CEC database)

Description

The model is based on a publication by Schmidt and Sauer.

$$\eta = \frac{p_{out}}{p_{in}} = \frac{p_{out}}{p_{out} + p_{loss}}$$

where $p_{out} = P_{out}/P_n$ is the fraction of the output power and the nominal power, p_{loss} is a term which describes normalized self consumption, p_{self}, normalized voltage losses v_{loss} on diodes and transistors and finally normalized ohmic losses r_{loss} following the equation

$$p_{loss} = p_{self} + v_{loss} p_{out} + r_{loss} p_{out}^2$$

which describes the efficiency as a function of output power.

When the inverter input power is used as the independent variable this leads to the equations

$$p_{loss} = p_{self}^* + v_{loss}^* p_{out} + r_{loss}^* p_{out}^2$$

and

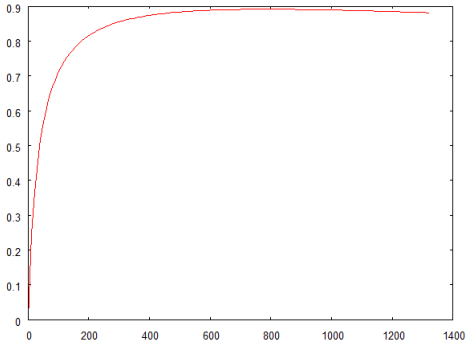
$$\eta = -\frac{1 + v_{loss}^*}{2 r_{loss}^* p_{in}} + \sqrt{\frac{(1 + v_{loss}^*)^2}{(2 r_{loss}^* p_{in})^2} + \frac{p_{in} - p_{self}^*}{r_{loss}^* p_{in}^2}}$$

The block IVPFIT can be used to determine the required parameters from manufacturers data sheets.

ivp.vseit



In a DO block inverter input power values are generated from 0 to 1500 W in steps of 10 W. The IVP block calculates the corresponding output power and efficiency. The PLOT block displays the efficiency as a function of the output power.



See also

Block IVPFIT