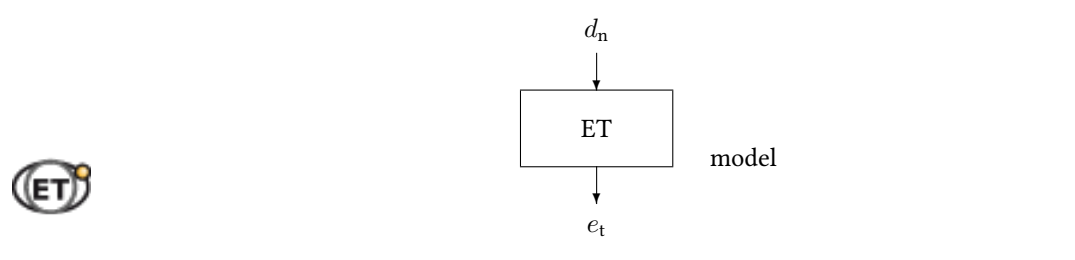


Block ET

The ET block calculates the equation of time.



Name	ET
Function	em0003
Inputs	1
Outputs	1
Parameters	1
Strings	0
Group	S

Inputs

- 1
- Day of the year d_n

Outputs

- 1
- Equation of time e_t / min

Parameters

- 1
- Approximation
- 0
- Spencer
- 1
- Wagner
- 2
- Duffie Beckman
- 3
- DIN 5034 Teil 2
- 4
- Woolf 1968
- 5
- Lamm 1981

Strings

None

Description The equation of time e_t describes the difference between true solar time t_τ and mean solar time t_μ

$$e_t = t_\tau - t_\mu$$

A relatively simple formula for the equation of time is given by Duffie and Beckman

$$e_t = 9.87 \sin(2B) - 7.53 \cos(B) - 1.5 \sin(B)$$

where

$$B = \frac{360(d_n - 81)}{364}$$

According to Spencer the Fourier series

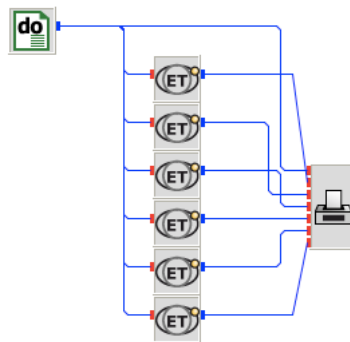
$$e_t = (0.000075 + 0.001868 \cos(d) - 0.032077 \sin(d) - 0.014615 \cos(2d) - 0.04089 \sin(2d))(180 \cdot 4/\pi)$$

yields more precise results. d denotes the **day angle** defined by

$$d = \frac{2\pi(d_n - 1)}{365}$$

Both formulas are implemented in the **ET** block.

et.vseit



A **DO** block provides the days of a year starting from 1 to 365. Six **ET** blocks calculate the equation of time for the different approximations starting with Spencer's Fourier series (upper block) to Lamm's approximation (lower block).

The `PLOT` block shows that the differences are nearly negligible.

