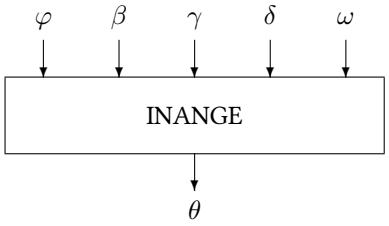
Block INANGE

The INANGE block calculates the incidence angle of beam radiation on an arbitrarily oriented plane, when the position of the Sun is given in equator coordinates.





Name	INANGE
Function	em0007
Inputs	5
Outputs	1
Parameters	0
Strings	0
Group	S

Inputs

1	Latitude $\varphi \in [-90°, +90°]$, northern hemisphere positive
2	Slope β
3	Azimuth angle of the surface γ (north $= 0°$, east $= 90° \ldots$ west $= 270°$)
4	Declination of the Sun δ / °
5	Hour angle of the Sun ω ($0° \ldots 360°$west)

Outputs

1	Incidence angle θ / ° between beam radiation and surface normal

Parameters

None

Strings

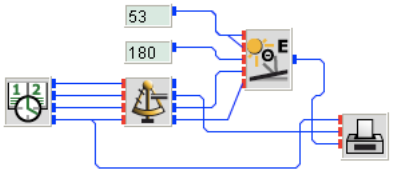
None

Description

The incidence angle θ is calculated from the equation

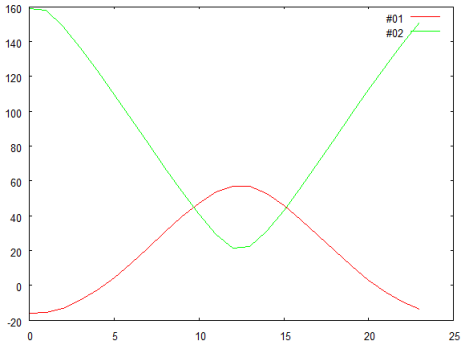
$$\begin{aligned}\cos\theta &= \sin\delta\ (\sin\varphi\ \cos\beta + \cos\varphi\ \sin\beta\ \cos\gamma)\\ &\quad + \cos\delta\ \cos\omega\ (\cos\varphi\ \cos\beta - \sin\varphi\ \sin\beta\ \cos\gamma)\\ &\quad - \cos\delta\ \sin\beta\ \sin\gamma\ \sin\omega\end{aligned}$$

inange.vseit



A CLOCK block runs through the 23rd of May 2010 in steps of one hour. A SUNAE block calculates the position of the Sun for a latitude of 53 degrees, 8 degrees east (that is close to Oldenburg, Germany).

Assuming latitude and tilt angle equal to 53 degrees with a surface facing south (azimuth 180 degrees) the INANGE block calculates the incidence angle using equator coordinates and the PLOT block displays the elevation of the Sun and the incidence angle as a function of the hour of the day.



See also

Block INANGH.