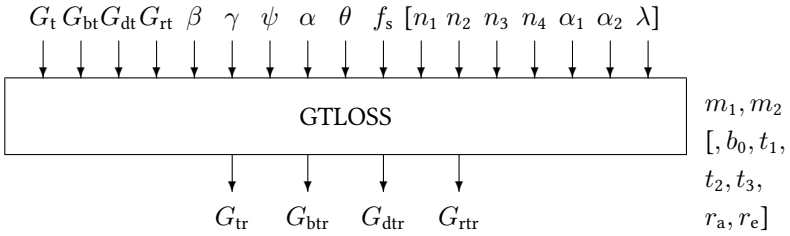
Block GTLOSS

The GTLOSS block calculates losses of radiation incident on a tilted solar module. Four different models can be used to calculate the reflection and eventually absorption losses due to incidence angles of the light not equal to zero. The block provides two models to calculate the losses of the diffuse radiation.





Name	GTLOSS
Function	em0004
Inputs	10 . . . [17]
Outputs	5
Parameters	2 . . . [8]
Strings	0
Group	S

Inputs

1	Global radiation on tilted surface G_t / W m^{-2}
2	Beam radiation on tilted surface G_{bt} / W m^{-2}
3	Diffuse radiation from sky on tilted surface G_{st} / W m^{-2}
4	Diffuse radiation from ground on tilted surface G_{rt} / W m^{-2}
5	Slope β / °
6	Azimuth of module γ / °
7	Azimuth of the Sun ψ (north $= 0°,$ east $= 90° \ldots$ west $= 270°$)
8	Elevation of the Sun α / °
9	Incidence angle θ / °
10	Soil loss factor f at $\theta = 0$
11	Refraction index of layer 1 (usually glass) n_1
12	Refraction index of layer 2 (e. g., EVA) n_2
13	Refraction index of layer 3 (e. g., TiO_2) n_3
14	Refraction index of layer 4 (usually Si) n_4
15	Absorption coefficient of layer 1 α_1 / m^{-1}

16 Absorption coefficient of layer 2 α_2 / m^{-1}
17 Wavelength λ / nm

Outputs

1 Global radiation on tilted surface with reflection G_{tr} / $\mathrm{W\,m}^{-2}$
2 Beam radiation on tilted surface with reflection G_{btr} / $\mathrm{W\,m}^{-2}$
3 Diffuse radiation from sky on tilted surface with reflection G_{str} / $\mathrm{W\,m}^{-2}$
4 Diffuse radiation from ground on tilted surface with reflection G_{rtr} / $\mathrm{W\,m}^{-2}$
5 Effective transmissivity

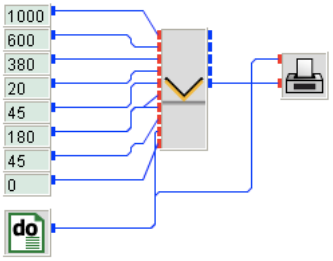
Parameters

1 Model of beam radiation m_1
  0 Sjerps-Koomen / Alsema
  1 ASHRAE
  2 Krauter
  3 Lanzerstorfer
2 Model of diffuse radiation from sky m_2
  0 Duffie / Beckmann
  1 DIN 5034
3 ASHRAE Parameter (0.05 is a good guess)
4 Thickness of layer 1 t_1 / m
5 Thickness of layer 2 t_2 / m
6 Thickness of layer 3 t_3 / nm
7 Number of segments for integration over azimuth r_{a}
8 Number of segments for integration over elevation r_{e}

Strings

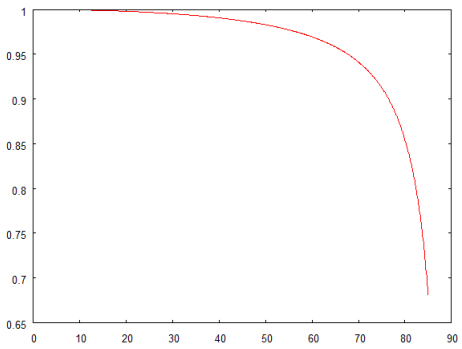
None

gtloss.vseit



The example shows an application of the most simple loss mechanism simulation based on the ASHRAE model. All inputs are set constant except the incidence angle which is varied between zero and 85 degrees by a DO block.

A PLOT block shows the effective transmittance as a function of the incidence angle.



For further examples, please refer to the `examples` directory.

Remark The GTLOSS block is still in an experimental stage and will probably be redesigned in the future.