

[9] Oteiza P, Pérez-Burgos A. (2012). Diffuse illuminance availability on horizontal and vertical surfaces at Madrid, Spain. *Energy Convers. Manag.* 64: 313-319. <http://doi.org/10.1016/j.enconman.2012.05.022>

[10] Chantana J, Ueno S, Ota Y, Nishioka K, Minemoto T, Uniqueness verification of direct solar spectral index for estimating outdoor performance of concentrator photovoltaic systems. *Renew. Energy* 75: 762-766. <http://doi.org/10.1016/j.renene.2014.10.059>

[11] Marino C, Nucara A, Pietrafesa M. (2017). Does window-to-wall ratio have a significant effect on the energy consumption of buildings? A parametric analysis in Italian climate conditions. *J. Build. Eng.* 13: 169-183. <http://doi.org/10.1016/j.jobe.2017.08.001>

[12] Dal Pai A, Escobedo JF, Dal Pai E, de Oliveira AP, Soares JR, Codato G. (2016). MEO shadowing method for measuring diffuse solar irradiance: Corrections based on sky cover, *renew. Energy* 99: 754-763. <http://doi.org/10.1016/j.renene.2016.07.026>

[13] Höppe P. (1992). A new procedure to determine the mean radiant temperature outdoors. *Wetter Und Leb.* 44: 147-151.

[14] Reindl DT, Beckman WA, Duffie JA. (1990). Diffuse fraction correlations. *Sol. Energy* 45: 1-7. [http://doi.org/10.1016/0038-092X\(90\)90060-P](http://doi.org/10.1016/0038-092X(90)90060-P)

NOMENCLATURE

I	Solar irradiance, Wm^{-2}
Ix^+	solar irradiance measured by the sensor facing the positive direction of the x axis, Wm^{-2}
Ix^-	solar irradiance measured by the sensor facing the negative direction of the x axis, Wm^{-2}
Iy^+	solar irradiance measured by the sensor facing the positive direction of the y axis, Wm^{-2}
Iy^-	solar irradiance measured by the sensor facing the negative direction of the y

	axis, Wm^{-2}
Iz^+	solar irradiance measured by the sensor facing the positive direction of the x axis, Wm^{-2}
Iz^-	solar irradiance measured by the sensor facing the negative direction of the x axis, Wm^{-2}
R_b	conversion factor for the direct solar irradiance

Greek symbols

θ	Solar beam incidence angle, rad
α	Solar altitude, rad

Subscripts

x^+ ,	Relative to the surface of the plane perpendicular to the x axis and oriented towards the its positive direction
x^-	Relative to the surface of the plane perpendicular to the x axis and oriented towards the its negative direction
y^+	Relative to the surface of the plane perpendicular to the y axis and oriented towards the its positive direction
y^-	Relative to the surface of the plane perpendicular to the y axis and oriented towards the its negative direction
z^+	Relative to the surface of the plane perpendicular to the z axis and oriented towards the its positive direction
z^-	Relative to the surface of the plane perpendicular to the z axis and oriented towards the its negative direction
d	Diffuse radiation
b	Direct radiation
r	Reflected radiation