



Video 4 documentation

Blades and Sunscreen. Glazing and Skylights. Heat pump support

Solar Thermal Collecting System with Changing Images Generation

ALCREA SOLAR Project

c/ Mercurio 15.

28224 Pozuelo de Alarcón. Madrid

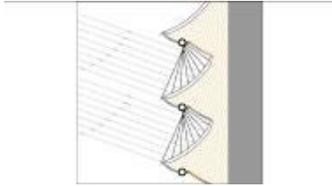
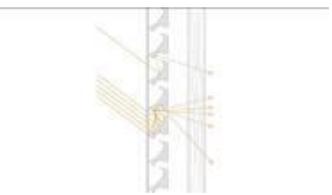
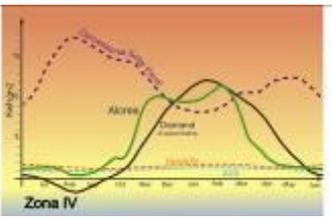
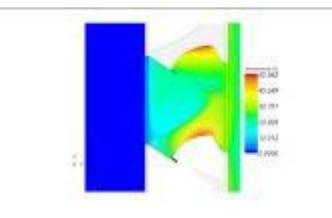
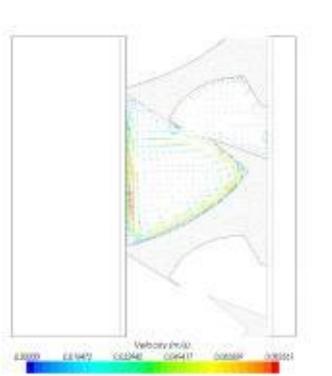
Tfno: 913529395

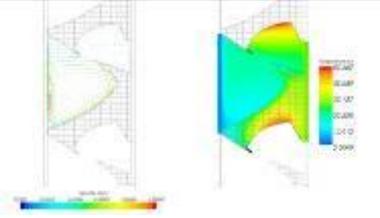
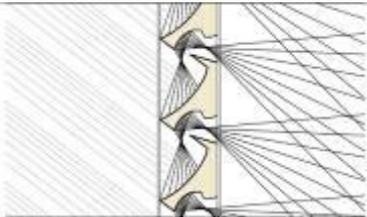
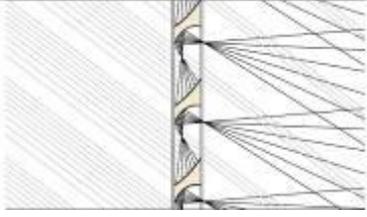
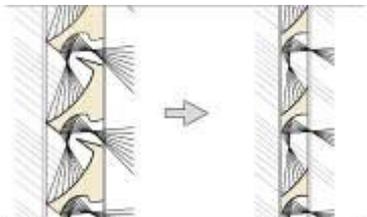
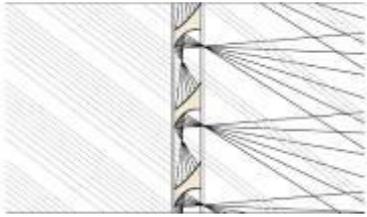
alcreasolar@alcreasolar.com

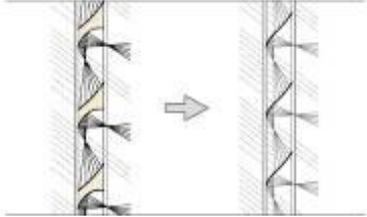
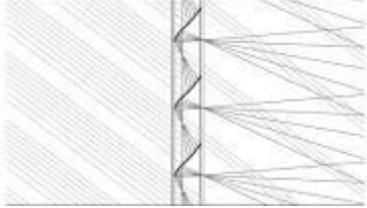
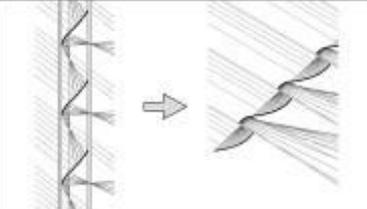
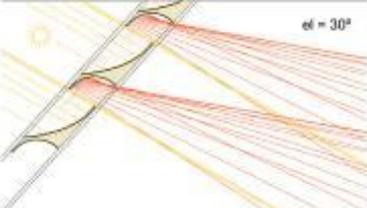
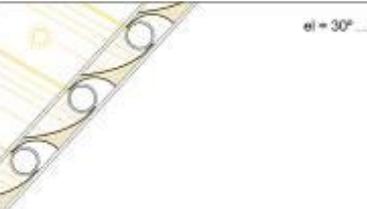
www.alcreasolar.com

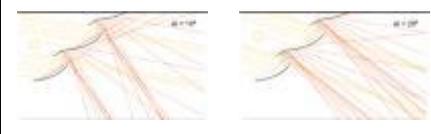
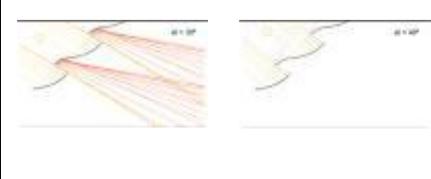
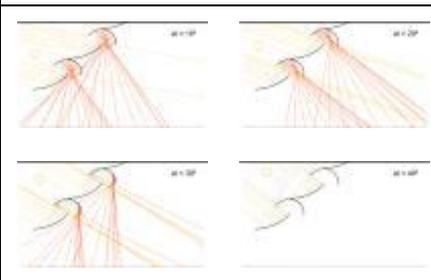
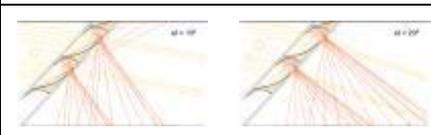
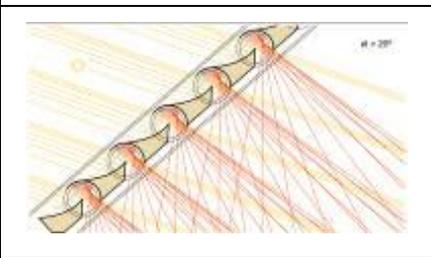
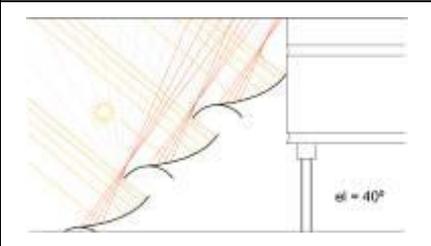
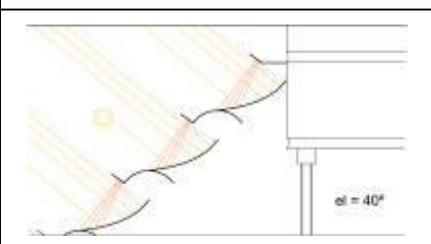
Versión 1.0 7/5/2004

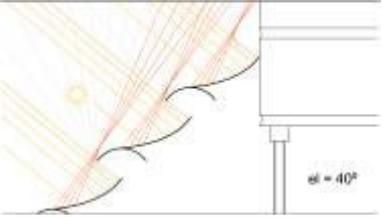
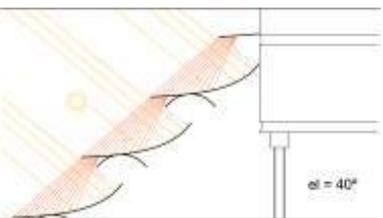
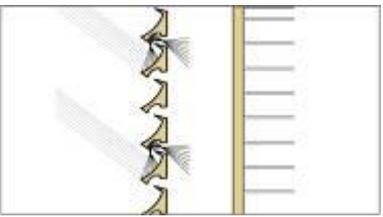
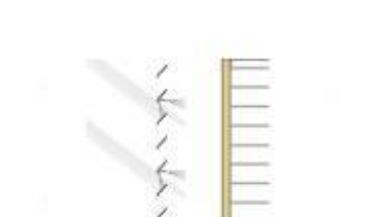
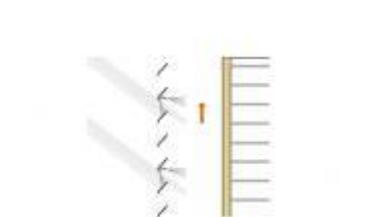
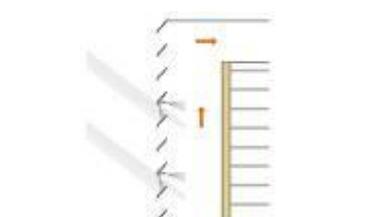
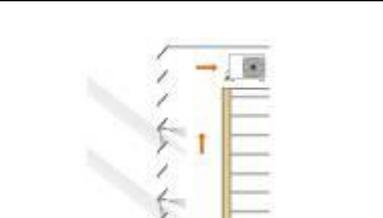
Blades and Sunscreen. Glazing and Skylights. Heat Pumps support

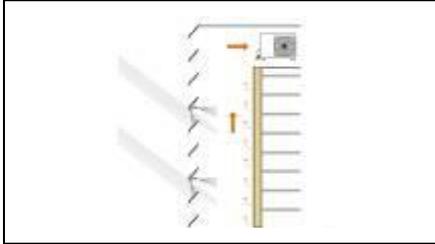
	<p>Generally, the main patent refers to collect the radiation on an absorbing area. However, other possibility is to redirect the radiation directly inside the house or building, after been reflected on the concentrator.</p>
	<p>Basically it is like removing the absorbing area, allowing light and radiation to reach a concave reflexive surface, which reflects them through the panel, or louver, glazing or divisor that is used.</p>
	<p>This allows to illuminate or to heat the inside according to the seasonal thermal demand curve, that is, a lot in winter and little in summer.</p>
	<p>The concave reflexive surface can be optimized according to different criteria, for example, creating small cavities between glasses that reduce the air movement. These cavities formed between two glasses greatly reducing the thermal conductivity of the crystal, while the summer-winter discrimination is still kept.</p>
	<p>This image, which is obtained by finite elements analysis, shows a typical winter situation. In this situation, the radiation goes into by the external cold glass that is at the left side.</p>
	<p>When the sunlight is reflected, it is redirected inside by a little window. The absorbed radiation warms the air that is located at the wall cavity, which is created by the concave reflexive surface. This air is transferred partly to the internal glass.</p> <p>If an insulating material is chosen for the blade or contour, an enclosure wall is created, which is named light wall. Furthermore to provide this differentiated pass of the light for summer or winter, it has a thermal conductivity around 1W/m2/K.</p>

	<p>The picture shows the speed distribution of the air into the two cavities. As could be seen, speeds that there are at the concave reflexive surface cavity are very low. That situation provides this great insulation of the light wall.</p>
	<p>The thickness of the wall could be from a few of centimetres to 15 or 20, depending on the need, and the cost is even lower as the cost of some conventional walls.</p> <p>In summer, the most part of the radiation is reflected again to the sky through the exterior glass. Although the wall cavity of the concentrator gets warm, just a little of this heat and this radiation pass to inside.</p>
	<p>The calculation of this concave reflexive surface is relatively complex. It would be summarized on: "the sunbeam with lower elevation that falls on each point of the concave reflexive surface, which reflects towards the nearness of the point 67". Apart from this, the section 67 is not necessarily straight.</p>
	<p>If it is no required to maximize the insulation, a simplified slat could be used. Furthermore to get properly the discrimination between winter and summer, it allows an ample sight to the outside and still keeps giving an important insulation.</p>
	
	<p>This slat is very easy to fabricate and it is a simplification from the previous one. It corresponds more or less to its central part, removing the peak.</p>
	<p>If the geometry and the position of the key points of this configuration are optimized according to the patent, the concave reflexive surface of this simple slat will be a circumference or an ellipse with a low eccentricity.</p>

	<p>Even with this, slats could be more simplified, keeping pretty well the characteristic of let the pass of light and the sun radiation according to the seasonal thermal demand curve for each locality.</p>
	<p>Although could seem that this simplification is as easy as has been represented, the geometry and the key points optimization is more complex than the one for the slat that has "web", such as a web of a beam.</p> <p>The optimal concave reflexive surface is still being a circumference that is tangent and extension on a point of the parabola, which is the concentrator.</p> <p>This slat-sheet or slat without web is really appropriate to outsides, for shading and sun screening. This is due to its simplicity and price, in addition to its elegance.</p> <p>On the other hand, in addition to the external venetian blind, this kind of slat-sheet could be a venetian blind which has the capacity of being folded, as usual. Or, it could be placed ahead of a Trombe-wall, to make it be heated just which is needed in winter and as little as possible in summer.</p>
	<p>Slats solutions for vertical walls are applicable to slats for roofs or slope surfaces. They still meet the requirements about the discriminated pass of light and radiation.</p>
	<p>Similarly, the slat could have a core and be placed between two crystals. In this way, it is also achieved a really good insulation and cleanliness.</p>
	<p>With small modifications, an only design could be ready to accomplish these functions of slats, as well as to insert vacuum tubes between the slats and heating water according to the demand curve. The lateral frame would have the holes to install the vacuum tubes, when that is the application.</p>

	<p>An additional characteristic about these configurations is scattering the direct light and redirecting it toward the vertical.</p>
	<p>With that it could be created an ideal roof light, which lets the light pass in winter and provides shading in summer. In addition, it has a great thermal insulation and illuminates the floor and the inner courtyard in a very uniform way.</p>
	<p>If is required to the light that pass to indoor be more vertical, the concave reflexive surface could be lengthened, though this makes complex the slat design.</p>
	<p>These slats with the concave reflexive surface lengthened could be also placed within crystals.</p>
	<p>Slats with a concave reflexive surface lengthened are also applicable to vertical surfaces or vertical glazing, to scatter more the light and to redirect it down.</p>
	<p>And, as for the optimal design the concave reflexive area is a circumference, this could be created at the external crystal of a vacuum tube and achieve an enclosure with a very low thermal conductivity. The concentrator would continue inside a vacuum tube, which could be a simple tube, not two concentric tubes.</p>
	<p>The patent protects other version of slats, which optimize or solve issues that could have some applications. For example, if these dispositions of slats are used as a sun screening between two floors, sometimes the slats could reflect the light toward the upper floor although it is shading the lower floor.</p>
	<p>And this could be solved quite well with a no reflexive extension at the beginning of the concave reflexive area. This extension has the same slope than the maximum angle that is expected to collect and reaches the horizontal position of the end of concentrator.</p>

	<p>In other cases, could be interested to extend the concentrator until a point close to the previous one. That makes bigger the performance of the original design of a slats-sheets or S slat.</p>
	
	<p>Moreover, if an external Venetian with this blade type is created provides optimum shading to the facade with a low cost, especially if the system is simple blades.</p>
	
	<p>In winter most of the light passes through the external Venetian and impinges against the façade, and the air between both is highly heated, especially if the facade is dark.</p>
	<p>The increase of this intermediate air temperature may be 10 ° and sometimes this increase will be enough to get the air inside the building.</p>
	<p>When not enough temperature is reached, the hot air can be sucked by a heat pump, and the coefficient of performance of the same, the COP can be increased up to 40%.</p> <p>The result is that this energy harvested costs around 2 cents per kilowatt hour and the total energy produced by the heat pump may be around 3 c€/kWh.</p>



This configuration also allows use partially the heat lost by the building itself , which would also be sucked into the heat pump , and this system of external venetian with a heat pump can compete with traditional systems of facade's refurbishment, being able even applied in roofs.