The results of the thermal camera show the reliability of the simulation results in relation to the surface temperatures, since the results of the two measurements at the same time were similar.

The maximum temperature of the roof recorded by the thermal camera was 51,1°C in the area without the reflective paint. In the thermodynamic simulation, the maximum value of the roof was 45°C. On the surface of the painted roof the thermal camera recorded approximately 22°C, while the temperature simulation was 25°C. The panels temperature showed the greatest disparity with a difference of 10°C between the value simulated and measured by the thermal camera. The difference can be attributed to the difference between the absorbance and reflectance indices and those provided by the software in which the simulation routinvai es were performed.

4. Conclusion

This paper presented thermodynamical simulation results of two photovoltaic systems installed on a galvanized steel surface with and without reflective paint. The simulation was done using the finite element method and had the objective to show the influence of the surface material where the photovoltaic panels are installed at their operating temperature.

The results of the simulation as well as the measurement made by the thermal camera showed that the surface painted with reflective paint reached lower temperatures than the adjacente areas where the original characteristics of the roof. From 2 p.m to 3 p.m, when the solar incidence is very high, the difference between the maximum and minimum temperature reaches 20°C.

The material used on the installation surfaces of the photovoltaic panels can help to reduce the operating temperature of the panels and consequently increase the energy production, improving the energy efficiency.

The solar reflectance of the paint directly affects the thermal performance of the painted surfaces, proving that to a higher solar reflectance of the paint (or the lower is the absorption), lower is the surface temperature of the coating.

The reflective paint has a high emissivity index and a low absorption index, so that the solar irradaynce reaching a certain surface is not absorbed, resulting in the temperature reduction of the surface and environment.

Acknowledgement

The authors would like to thank the partners from Nucleus of Experimental and Technological Studies and Research (NExT) for all the aid during the progress of the research, the Foundation for Research Support of Goiás (FAPEG) by the project financing and the Faculty of Electrical Engineering of the Federal University of Goiás by the provision of important information.

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