

## Parabolic trough collectors. Fundamentals of heat transfer applied to solar thermal energy.

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### Resumen

Solar thermal energy has undergone major development in recent years. The most widely used technologies are central receiver solar towers and parabolic trough collectors (PTC)[1]. The latter technology has great advantages due to its higher optical and thermal efficiency, but, despite being a well-proven technique, it presents certain problems inherent to the manufacturing and durability of some critical elements in the system. They are generally composed of an absorber tube surrounded by a glass cover and in the intermediate space, a vacuum is created to minimize thermal losses by convection[2]. The absorber tube is located at the focal line of a parabolic mirror that concentrates sun's rays. To predict the thermal behavior of this type of system, ray-tracing techniques are used to determine the thermal load and accurate correlations are also needed to calculate the convective heat transfer. Also, the original design shows some problems such as the selective coating applied on the absorber surface, whose thermal performance decays with time. Besides, the metal-glass welding are also a significant weak spot, which due to the thermal expansion can cause the partial or total loss of the vacuum in the aforementioned annulus. In this work we present the results of the modeling of this type of systems in different working configurations, as well as a new design proposal to improve the thermal transfer in this type of systems.

### Referencias

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