

## Numerical Modeling and Characteristic Analysis of a Parabolic Trough Solar Collector

**Authors :** Alibakhsh Kasaeian, Mohammad Sameti, Zahra Noori, Mona Rastgoo Bahambari

**Abstract :** Nowadays, the parabolic trough solar collector technology has become the most promising large-scale technology among various solar thermal generations. In this paper, a detailed numerical heat transfer model for a parabolic trough collector with nanofluid is presented based on the finite difference approach for which a MATLAB code was developed. The model was used to simulate the performance of a parabolic trough solar collector's linear receiver, called a heat collector element (HCE). In this model, the heat collector element of the receiver was discretized into several segments in axial directions and energy balances were used for each control volume. All the heat transfer correlations, the thermodynamic equations and the optical properties were considered in details and the set of algebraic equations were solved simultaneously using iterative numerical solutions. The modeling assumptions and limitations are also discussed, along with recommendations for model improvement.

**Keywords :** heat transfer, nanofluid, numerical analysis, trough

**Conference Title :** ICMEM 2016 : International Conference on Mechanical Engineering and Mechatronics

**Conference Location :** Prague, Czechia

**Conference Dates :** March 30-31, 2016