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DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

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TECHNOLOGY
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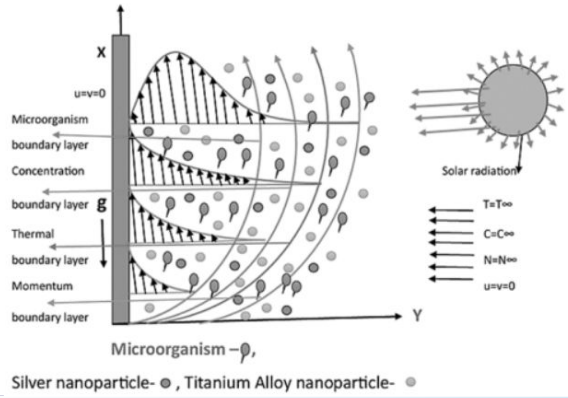
PENDING

(IN202411077016)
A system and a method for heat-transfer analysis in a solar collector



NEED

30% of solar thermal systems suffer performance losses due to undetected heat transfer inefficiencies, causing $4B in lost energy annually. Industries urgently require smart solar collectors that monitor, predict, and optimize energy capture without manual calibration delays.

TECHNOLOGY OVERVIEW

This system integrates sensors within a solar collector to measure temperature, flow, and irradiance. A processor analyzes the data using a fractional derivative model with hybrid nanofluids, delivering highly accurate heat transfer and entropy values without external intervention or disruption to energy collection.

TECHNOLOGY KEY FEATURES

Embedded sensing, Maxwell hybrid nanofluid modeling, fractional derivative computation, real-time heat transfer profiling, integrated entropy analysis, solar-specific parameters like Nusselt and Sherwood numbers, auto-calibration, compatibility with parabolic trough collectors.

Read more here

MARKET ANALYSIS

The global solar thermal market is projected to grow at 8.5% CAGR, reaching $36.5 billion by 2033 (source: Market Research Future, 2024). India's solar thermal market is growing at 10.2% CAGR, fueled by industrial and residential demand (source: Mordor Intelligence, 2024).

Target Industries

Renewable Energy Infrastructure, Industrial Process Heating, Smart Building Solutions. , Solar thermal system integrators, renewable energy analytics providers, R&D centers developing advanced solar materials and control systems.

AT A GLANCE

- SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 13 (Climate Action)

Technology is available for licensing/ co-development.

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