

Design scheme for the relationship between fluid machinery and solar container

<div class="df_qntext">Can computational fluid dynamics optimize solar thermal collectors using micro-heat pipe arrays?

Scientific Reports 15, Article number: 24528 (2025) Cite this article The present paper provides a novel hybrid computational framework that integrates Computational Fluid Dynamics (CFD) with advanced machine learning techniques to optimize solar thermal collectors employing micro-heat pipe arrays (MHPA) for food dehydration applications.

<div class="df_qntext">Can hybrid solar thermal collector design improve solar food drying systems?

The hybrid methodology shows promise for efficiently optimizing solar thermal collector designs at lower computational costs than traditional methods to provide valuable insights for solar food drying systems.

<div class="df_qntext">How does hybrid CFD-ml optimize solar thermal collector efficiency?

Figure 3 presents the workflow diagram of the hybrid CFD-ML methodology for optimizing solar thermal collector efficiency. The process begins with CFD baseline model development and experimental validation, followed by parameter range definition for input variables and thermal efficiency output.

<div class="df_qntext">Why is fluid dynamics important in hydroelectric systems?

In hydroelectric systems, understanding fluid dynamics aids in optimizing the design of turbines and dams. Water flowing through a dam converts potential energy to kinetic energy, and then to mechanical energy through turbines.

<div class="df_qntext">Can hybrid drive solutions be used for a high-performance solar desalination system?

Furthermore, we present the potential of hybrid drive solutions for the future design of interference-resistant, fast-response, all-weather desalination systems. This Review aims to provide guidance for the development of high-performance solar desalination integrated devices and their large-scale industrial applications.

<div class="df_qntext">How can nanostructured materials improve vapor generation and transport?

Enhanced vapor generation and transport can be achieved through the incorporation of advanced nanostructured materials, which also optimize the light absorption capacity and thermal properties of the system.

In particular, with the help of CFD technology, researchers can observe the abnormal flow phenomenon in fluid machinery more intuitively and achieve the rapid design and automatic ...

To address the intermittent and fluctuating issues of solar energy, in recent years, integrated solar flow batteries have experienced a rocketing development due to their unique ...

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Design Optimization of Fluid Machinery: Applying Computational Fluid Dynamics and Numerical Optimization Drawing on extensive research and experience, this timely reference brings ...

LZY-MS3 Bolt-On Solar Container delivers modular power generation with easy-to-install detachable solar panels. Quick deployment for construction sites, remote industrial applications and disaster ...

Abstract This study addresses the pressing need for eco-friendly potable water production, exploring the promising avenue of solar distillation. To overcome limitations in traditional ...

Keywords: fluid machinery and system, design and optimization, efficiency improvement, unsteady flow, computational fluid dynamics Citation: Ji L, Agarwal RK, Kan K, Tao R, ...

This article determined the mathematical relationships between fuel consumption and operation parameters, such as rotational speed, draught, trim, hull fouling time, wind speed, wave ...

Present study aims to increase the effectiveness and penetration of innovative floating solar systems by exploring the potential for the development of floating solar PV-based hybrid ...

With the development of industrial society, the application scope of fluid machinery continues to expand, leading to higher demands for its performance. There is an urgent need to ...

Abstract Fluid machinery plays an important role in national pillar industries such as national defense, military, aerospace, heavy industry, energy and power and is also the main industrial energy source. ...

The aim of this is to introduce a comprehensive review work of the highlights that have been made through the recent years for most important studies about the CFD approach as a tool for ...

The present paper provides a novel hybrid computational framework that integrates Computational Fluid Dynamics (CFD) with advanced machine learning techniques to optimize solar ...

The analysis focused on elucidating the relationship between flow channel design and the concentration of oxygen and hydrogen. This article presents an innovative approach based on the ...

Fabrication of high-performance small-scale solar still systems to provide safe drinking water was the cornerstone of a colossal number researches over past decades. To reach this goal, a wide range of ...

The solar container can be used for short-term use at events, for longer use, for example over the summer months, or as a long-term solution. To cover the wide range of requirements, we make a ...



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