# Article information:

Conjugate heat transfer enhancement in the mini-channel heat sink by realizing the optimized flow pattern - ScienceDirect  
<https://www.sciencedirect.com/science/article/pii/S1359431120336115>

# Article summary:

1. A new method of realizing an optimized flow field to enhance the thermal hydraulic performance was carried out successfully in a mini-channel heat sink.

2. The optimized flow pattern was characterized by three pairs of longitudinal swirls, and inclined parallelepiped ribs were proposed to realize it.

3. The maximum average heat flux could achieve 3.2 × 106 W/m2 within a temperature difference of 60 K between substrate and fluid.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article “Conjugate Heat Transfer Enhancement in the Mini-Channel Heat Sink by Realizing the Optimized Flow Pattern” is a comprehensive review of the current research on mini-channel heat sinks and their potential for enhancing thermal hydraulic performance. The article provides an overview of various methods used to improve heat transfer performance, such as inlet and outlet arrangement, porous metal, special coolant, various channel shapes, and fluid disruption. It then focuses on the use of longitudinal vortex generators to disturb fluid flow for enhanced convective heat transfer. The authors propose a new method for realizing an optimized flow field in mini-channel heat sinks using inclined parallelepiped ribs to form three pairs of longitudinal swirls flow.

The article is generally reliable and trustworthy due to its comprehensive review of existing research on mini-channel heat sinks and its detailed description of the proposed method for achieving an optimized flow field with inclined parallelepiped ribs. The authors provide evidence from numerical simulations that this method can lead to significant improvements in thermal hydraulic performance, with maximum average heat flux reaching 3.2 × 106 W/m2 within a temperature difference of 60 K between substrate and fluid.

However, there are some potential biases that should be noted when considering this article’s trustworthiness and reliability. For example, while the authors provide evidence from numerical simulations that their proposed method can lead to improved thermal hydraulic performance, they do not provide any experimental evidence or data from actual implementations of their proposed method in mini-channel heat sinks. Additionally, while they discuss various methods used to improve heat transfer performance in mini-channel heat sinks, they do not explore any counterarguments or possible risks associated with these methods or their implementation in practice. Finally, while they provide recommendations for optimal parameters (e.g., pitch ratio and width ratio) for implementing their proposed method in mini-channel heat sinks, they do not discuss any potential limitations or drawbacks associated with these parameters or how they

# Topics for further research:

* Experimental evidence for mini-channel heat sinks
* Risks associated with mini-channel heat sink implementation
* Limitations of pitch ratio and width ratio in mini-channel heat sinks
* Counterarguments to mini-channel heat sink enhancement
* Potential drawbacks of mini-channel heat sink optimization
* Real-world applications of mini-channel heat sinks

# Report location:

<https://www.fullpicture.app/item/0e956cf2690e574eabaecf3cead93f8b>