البحث الثامن

بيانات البحث

رقم البحث في القائمة	8
العنوان باللغة الإنجليزية	Hydrothermal and entropy generation performance of convergent tubes with various dimple shapes
العنوان باللغة العربية	الأداء الهيدروليكى- الحراري والإنتروبي المولدة في الأنابيب المتقاربة ذات أشكال الدمامل المختلفة
عدد الباحثين	3
أسماء المؤلفين بالترتيب	**1. Amr Kaood** 2. Ahmed ElDegwy 3. Ahmed Aboulmagd
اسم المجلة	International Journal of Thermal Sciences
ISSN	1290-0729
الناشر	Elsevier Ltd.
التصنيف	مجلة علمية عالمية متخصصة ومحكمة
صفحة البحث	https://doi.org/10.1016/j.ijthermalsci.2023.108842
رقم المجلد	197
رقم العدد	-
ترقيم الصفحات	108842
تاريخ النشر	مارس 2024
مشتق من رسالة علمية؟	لا
بيان بدور المشاركين* *منصوص على أدوار المشاركين في نسخة البحث المنشورة	**Amr Kaood:** Conceptualization, Data curation, Formal analysis, Software, Supervision, Validation, Visualization, Writing - review & editing. Ahmed ElDegwy: Conceptualization, Data curation, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. Ahmed Aboulmagd: Data curation, Formal analysis, Writing - original draft, Writing - review & editing, Investigation.
مكان إجراء البحث	كلية الهندسة، جامعة الفيوم، مصر. الدراسة عددية ولم يتم إجراء أي تجارب معملية.

Abstract

This paper introduces a comprehensive study on the hydrothermal and entropy generation performance of convergent tubes designed with different dimple shapes. The effects of the dimple shape on the flow characteristics (heat transfer and friction) are investigated using validated computational fluid dynamics (CFD) numerical modelling and simulation tools. Inside convergent tubes with different dimple designs, turbulent flows are subjected to a continuous heat flux of 40 kW/m^2. Dimpled tube geometries of different diameter ratios (*DR*) were built within ANSYS-Fluent software (V2022 R2). Four different dimple shapes were investigated: (a) spherical, (b) cylindrical, (c) conical, and (d) stepped-conical. These dimple shapes were examined to investigate the optimal configuration with the best hydrothermal and entropy generation performance. A comparison is made against the baseline straight smooth tube case. The main performance indicators for comparison are Nusselt number (*Nu*), friction factor (*f*), and thermal enhancement factor (*TEF*), calculated for different Reynolds numbers, *Re* = 3000 to 40,000, and at different diameter ratios, *DR* = 1 to 2. In addition, thermal, viscous, and total entropy components, the Bejan number (*Be*), the enhanced entropy generation ratio ($N_{s,en}$), and the irreversibility distribution ratio (ϕ_s) are evaluated based on the selected geometrical configurations. The results showed that the dimple shape significantly affects the hydrothermal and entropy generation characteristics of convergent tubes. The best average value of the *TEF* was attained by convergent tubes with stepped-conical dimple shapes at *DR* = 1.75, which represents a 7.81% increase over the reference smooth tube (the maximum *TEF* value is 1.3243 at *Re* = 3000 and *DR* = 1.25). Furthermore, the minimum levels of $N_{s,en}$ were achieved by tubes with stepped-conical dimples, with average reductions of 36.92% over the studied *Re* range. The study provides valuable insights into the design and optimization of convergent tubes with various dimple shapes for various applications.