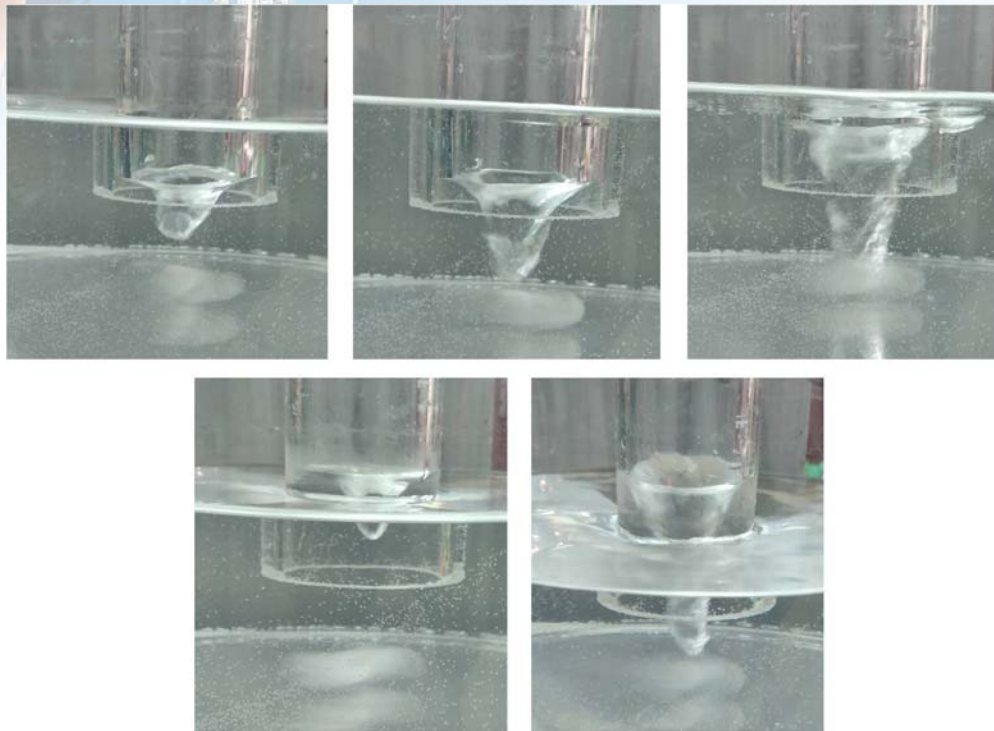


The background of the slide is a vibrant blue. On the left, a hand is shown holding a glowing, semi-transparent globe. Behind the globe, there are faint grid lines and plus signs. In the lower part of the image, a city skyline with various skyscrapers is visible, reflected on a glossy surface. The overall aesthetic is futuristic and technological.

MINIMALIZIRANJE TERMO-HIDRAULIČKIH IREVERZIBILNOSTI IZOLIRANOG VRTLOŽNOG POLJA NANOFLUIDA

Dr.sci. Fikret Alić, red.prof.

Predmet istraživanja



Cilj i metodologija





Cilj i metodologija

❖ **Cilj 1.** Analiza uticaja podizanja vrtloga na hidrauličku i termičku entropiju, sa i bez isparavanja nanofluida na međufaznoj površini.

❖ **Cilj 2.** Maksimizirana efikasnost zagrijavanja i isparavanja nanofluida.

❑ **M1.** Analitičko modeliranje

❑ **M2.** Numeričko modeliranje

❑ **M3.** Eksperimentalno ispitivanje

Cilj i metodologija

energies

MDPI

Article Entransy Dissipation Analysis and New Irreversibility Dimension Ratio of Nanofluid Flow Through Adaptive Heating Elements †

Fikret Alici

Faculty of Mechanical
Engineering, University of
Kragujevac, Kragujevac,
Serbia

Abstract: A hole of larger diameter heating elements to form a heating cylinder are arranged these hollow heat transfer elements to maintain appropriate temperature of the heating cylinder arrangement, the nanofluid's flow. Furthermore, a new entransy dissipation and irreversibility dimension ratio and its maximumizing.

Keywords: cylinder; nanofluid; heating elements; irreversibility; entransy dissipation

1. Introduction

In many cases, the use of heating elements is not sufficient for heating application. If the inner surface of the inner surface of fluid heaters along dimensions of the fluid, in this case, the convective heat transfer coefficient, thermal radiation, and the ability of heat transfer are not sufficient.

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ENTRANSY DISSIPATION ANALYSIS OF LIQUID VORTEX ISOLATED BY HOLLOW CYLINDER

Fikret Alici

Faculty of Mechanical
Engineering, University of
Kragujevac, Kragujevac,
Serbia

Original Manuscript

By modeling the vortex in a heat source is considered as a hole vortex of the liquid vortex, the hole vortex is modeled as a hole vortex of the liquid vortex. Furthermore, a new entransy dissipation and irreversibility dimension ratio and its maximumizing.

KEY WORDS: cylinder; nanofluid; heating elements; irreversibility; entransy dissipation

1. INTRODUCTION

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Transient entropy generation analysis of vortex liquid isolated by hollow heated cylinder

Fikret Alici

University of Kragujevac, Faculty of Mechanical Engineering, Faculty of Thermal and Fluid Science, Kragujevac, Serbia and Montenegro

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ABSTRACT

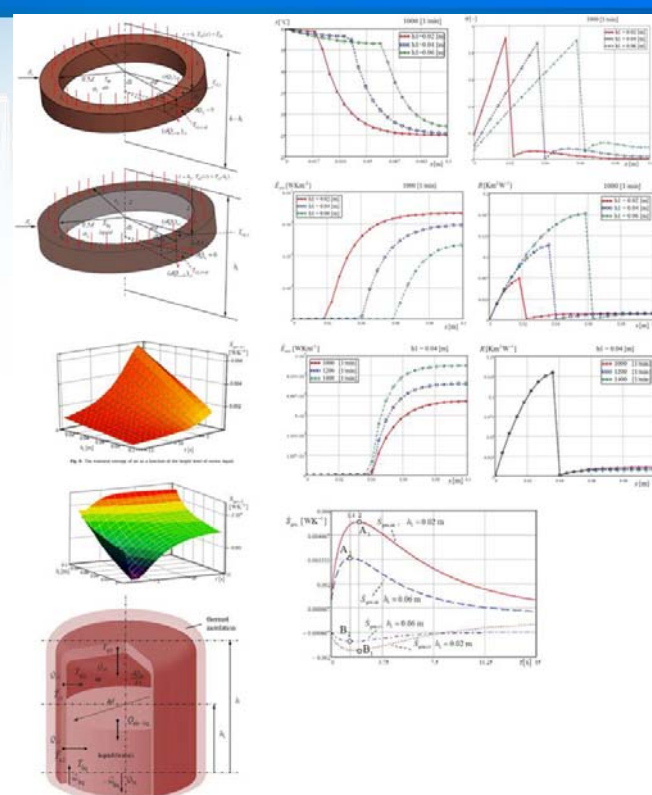
The total transient entropy generation of a system that consists of a liquid vortex within a hollow cylinder as a heat source is investigated in this article. The hollow cylinder isolates the liquid vortex, and generates an air vacuum above the vortex which causes to heat within the cylinder. The liquid vortex, at a value of 20% and 40%, partially fills the hollow cylinder. In both cases, the heat transfer was partially established between the inner surface of the hollow cylinder and the vortex liquid. This analysis focused on the transient exchange of energy generation between the cylinder and fluid. The heat exchange between the hollow heated cylinder and the fluid takes 15 s. The analysis of entropy generation includes only thermal irreversibility of the system. Irreversibility is explored.

1. Introduction

There are many ways to generate vortex liquid within a vessel or a tank of different sizes and shapes. Some of these vortices are generated with a mixer, which rotates at the bottom of the vessel and causes movement of the liquid to form a vortex liquid. In chemical and process engineering, the vortex is often generated using a magnetic stirrer. There are many types of research that study vortex liquid within a container or a tank. The average behavior of the flow field generated by a magnetic stirrer in a cylindrical container, observed using optical observation, particle image velocimetry measurements, and dye tracking methods was studied by Kikuchi et al. [1]. Ladd and Ishiguro [2], and Jang [3] have studied the most important modes of steadily isolated vortices in fluids of infinite extent. Wang et al. [4] investigated a three-dimensional CFD model which was developed in this work to simulate hydrodynamic characteristics of a gas-liquid two-phase stirred tank. Sagar et al. [5] studied three-dimensional numerical modeling of turbulent vortex flow in an annular passage, which is generated by introducing the flow through a tangential entry to the passage. Brown et al. [6] investigated the fundamental unit process within a Bayer circuit for the production of wet-oxide alumina, with the predominant technology used in the unit process being the mechanically agitated draft-tube process. There is much research that studies the heat exchange and entropy generation for the heating and cooling process and heat accumulation. Some of the investigations that are compatible with the research conducted in this article are as follows: Anderson and Gordon [7] studied optimal paths and compared them with common heat flux and a constant source temperature, including entropy generation and relative requirements for insulated heat-exchanging capacity. Rejan and Schultz [8] studied energy gain maximization through mass flow rate and energy storage processes. The minimum entropy generation of a latent heat thermal storage system was studied by Jurevic and Cerni [9]. The entropy generation analysis for the optimal design of a thermal energy storage system with Joule heaters was studied by Kraze [10]. Rouse et al. [11] studied

† E-mail address: alici@ptt.rs, alici@yandex.rs.

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Hipoteze

- ❖ **H1.** Hidraulički parametri izoliranog vrtloga unutar grijnog profiliranog rebra, imaju uticaj na povećanje generisane entropije.
- ❖ **H2.** Efekt samopodizanja vrtloga utiče na intenzitet razmijenjene topline te generisanu entropiju grijnog rebra i vrtloga nanofluida.



Hipoteze

- ❖ **H3.** Intenzifikacija generisanja mjehurića pare iznad izoliranog vrtloga, shodno karakteristikama vrtložnog polja, utiče na zagrijavanje nanofluida.
- ❖ **H4.** Periodično oscilovanje nanofluida oko spoljašnje površine grijnog rebra utiče na intenzivnije odvođenje topline s rebra na nanofluid.



Očekivani rezultati

- ❖ **R1.** Termo-hidraulički efikasan sistem zagrijavanja nanofluida grijnim rebrom
- ❖ **R2.** Unaprijeđeni sekundarni grijno-isparivački sklop te mogućnost optimiziranja istog, a što implicira novo industrijsko rješenje izmjenjivača topline.



HVALA !