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 b. Nomor ISSN : 0973-1458, eISSN: 0974-9845  
 c. Vol, No., Bln Thn : Vol 94 No 3, April 2020  
 d. Penerbit : Indian Physical Society  
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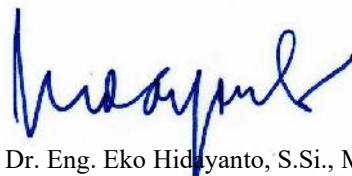
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 Bidang Ilmu: Fisika

Reviewer 2



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**2. Ruang lingkup dan kedalaman pembahasan:**

Paper membahas mengenai perbandingan model matematis dan hasil eksperimen untuk karakteristik arus tegangan pada lucutan plasma korona dari model electrode Multi titik-Bidang. Telah diperoleh hasil kesesuaian antara model matematis dan hasil eksperimen melalui grafik pengujian arus-tegangan.

**3. Kecukupan dan kemutakhiran data/informasi dan metodologi:**

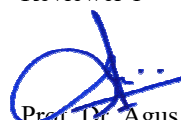
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Semarang, 4 Februari 2022

Reviewer 1



Prof. Dr. Agus Subagio, S.Si., M.Si.

NIP. 19710813 1995121001

Unit Kerja : Fisika

Bidang Ilmu: Fakultas Sains dan Matematika

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| d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)           | 12                                  |                          |                              | 11,6                       |
| <b>Total = (100%)</b>                                             | <b>40</b>                           |                          |                              | <b>38</b>                  |
| <b>Nilai Pengusul = 60% x 38 = 22,8</b>                           |                                     |                          |                              |                            |

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**2. Ruang lingkup dan kedalaman pembahasan:**

Paper ini membahas tentang perbandingan diantara model matematis dan hasil eksperimen dari karakteristik arus tegangan pada kasus lucutan plasma korona dari model electrode Multi titik-Bidang. Diperoleh tingkat kesesuaian diantara model matematis dan hasil eksperimen melalui grafik karakteristik arus-tegangan.

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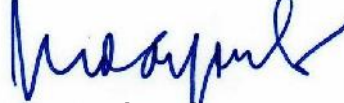
Data-data serta metodologi yang digunakan baik dan mendukung riset ini. Penelitian ini mempunyai tingkat originalitas yang tinggi (indeks kemiripan turnitin hanya 6%).

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Semarang, 20 Februari 2023

Reviewer 2



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# A study of the corona discharge theory for multipoint–plane configurations

Wardaya A.Y.<sup>a, b</sup>  ; Nur M.<sup>a</sup>; Suseno J.E.<sup>a</sup> Save all to author list<sup>a</sup> Department of Physics, Faculty of Science and Mathematics, Diponegoro University, Semarang, Indonesia<sup>b</sup> Master Program of Energy, School of Post Graduate Studies, Diponegoro University, Semarang, Indonesia3 42th percentile  
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Bendilmi, M.S. , Zeghloul, T. , Ziari, Z. (2022) *Journal of Electrostatics*

Experimental Characterization of a Tri-Needle-Type Corona Electrode in View of Improving Charging Uniformity

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## Abstract

This paper presents the numerical calculation of current–voltage (I–V) characteristics that were produced by a corona discharges plasma generator for a multipoint–plane configuration in air and its comparison with the experimental results. The total number of needles in this configuration is  $8 \times 4 = 32$  with the distance between the point-to-plane electrodes (denoted as  $c$ ) as the variable. The I–V characteristic curve of the numerical calculation results matches that of the experimental results for cases with a large distance  $c$  ( $c = 3$  and  $4$  cm), and it shows a large deviation for cases with a small distance  $c$  ( $c = 1$  and  $2$  cm). Differences in the I–V characteristic curve between the experimental and numerical results are due to the symmetrical spread of the ion current from the point-to-plane electrodes, which is more pronounced for larger values of  $c$ . © 2019, Indian Association for the

## Author keywords

Electric current; Electric field; I–V characteristics; Multipoint–plane configuration; Plasma generator  
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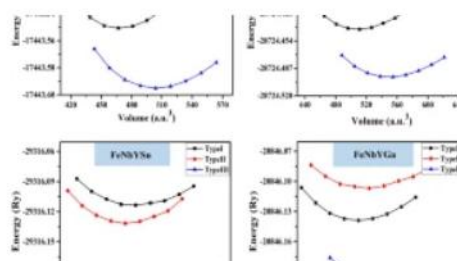
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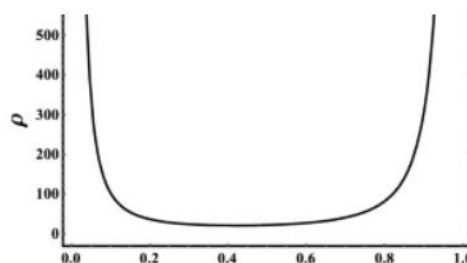
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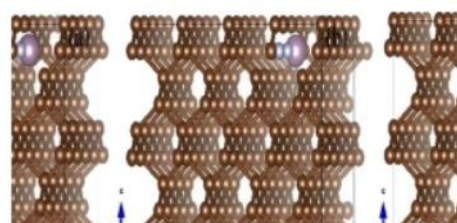
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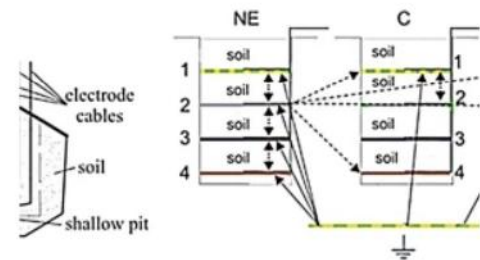
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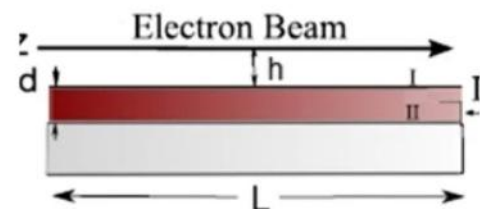
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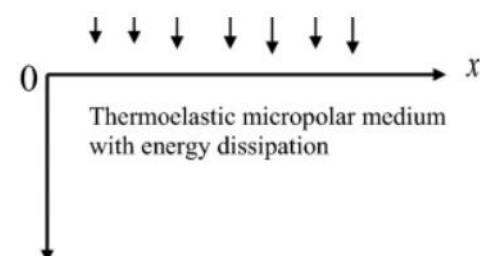
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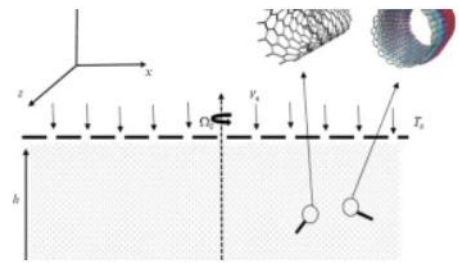
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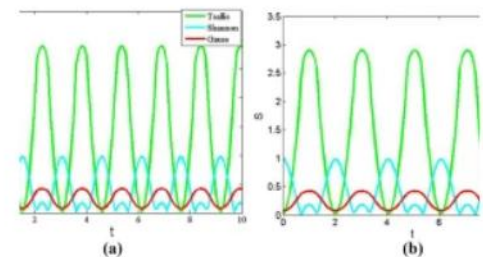
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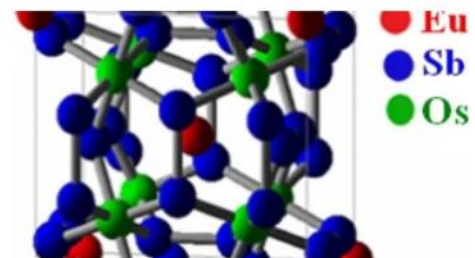
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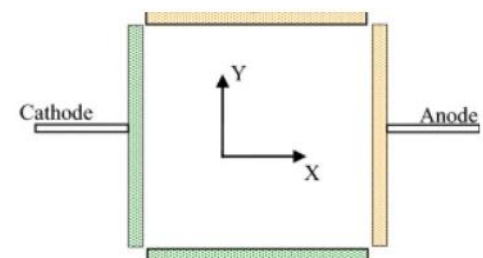
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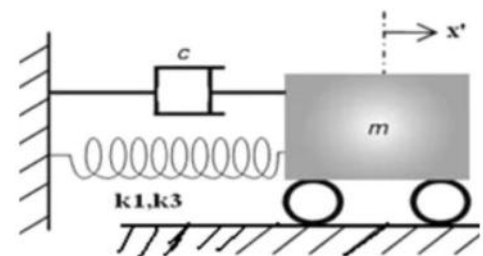
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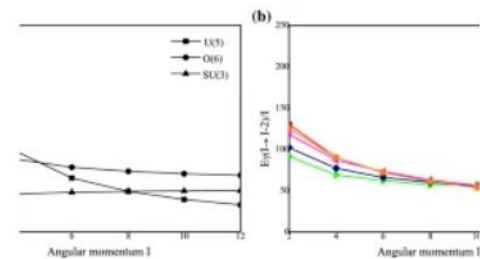
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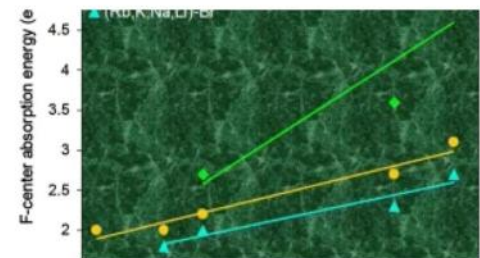
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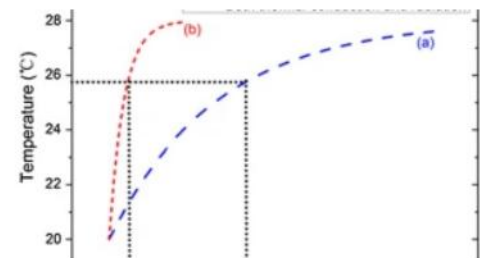
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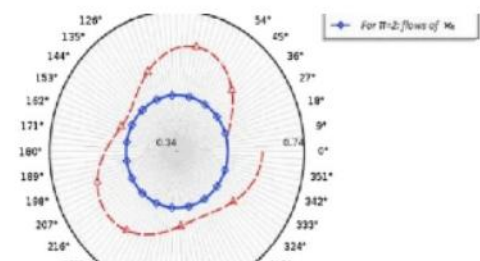
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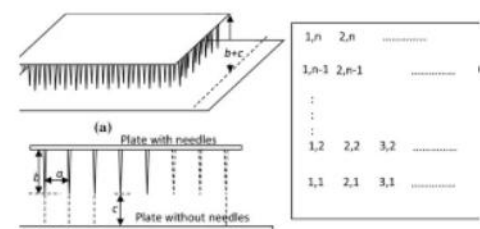
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# Optical Heisenberg ferromagnetic model for directional inextensible flows of spacelike curves with geometric phase

[Talat Körpınar](#) [Indian Journal of Physics](#) **94**, 403–408 (2020)**306** Accesses | **3** Citations | [Metrics](#)

## Abstract

In this paper, we introduce the notion of the Heisenberg ferromagnetic model for directional inextensible flows of spacelike curves by using the quasi-frame in the Minkowski space. Furthermore, we study some integrability conditions for quasi-frame fields. With this new concept, we derive the necessary and sufficient condition for the given curve to be the inextensible flow. Finally, we give some new characterizations for quasi-curvatures of the spacelike curve by Heisenberg ferromagnetic model and we obtain total phase for quasi-vector fields.

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## References

[1] S Baş and T Körpınar *Bol. Soc. Paran. Mat.***31**  
9 (2013)

[2] S Baş and T Körpınar *J. Adv. Phys.***7** 251  
(2018)

[3] G Chen and Q Wang *Opt. Quantum  
Electron.***27** 1069 (1995)

[4] Z S Körpınar, M Tuz and T Körpınar *Int. J.*

*Theor. Phys.***55** 8 (2016)

---

[5] Z S Körpınar, E Turhan and M Tuz *Int. J. Theor. Phys.***54** 3195 (2015)

---

[6] Z Körpınar and M İnç *J. Adv. Phys.***7** 239 (2018)

---

[7] G L Lamb *J. Math. Phys.***18** 1654 (1977)

---

[8] S Muruges and R Balakrishnan *Phys. Lett. A***290** 81 (2001)

---

[9] M Yeneroğlu *Open Math.***14** 946 (2016)

---

[10] Z. Körpınar *Therm. Sci.* **22** 87 (2018)

---

[11] M V Berry *Proc. R. Soc. Lond. A Math. Phys. Sci.***392** 45 (1984)

---

[12] X S Fang and Z Q Lin *IEEE Trans. Microwave Theory Tech. MTT***33** 1150 (1985)

---

[13] J N Ross *Opt. Quantum Electron.***16** 455 (1984)

---

[14] A Tomita and R Y Chiao *Phys. Rev. Lett.***57**

937 (1986)

---

[15] F Wassmann and A Ankievich *Appl. Opt.***37**  
18 (1998)

---

[16] R Balakrishnan, R Bishop and R Dandoloff  
*Phys. Rev. Lett.***64** 2107 (1990)

---

[17] R Balakrishnan, R Bishop and R Dandoloff  
*Phys. Rev. B***47** 3108 (1993)

---

[18] R Balakrishnan and R Dandoloff *Phys. Lett.*  
*A***260** 62 (1999)

---

[19] T Körpınar *Acta Sci. Technol.***37** 245 (2015)

---

[20] T Körpınar, R C Demirkol *Int. J. Geom.*  
*Methods Mod. Phys.***15** 1850020 (2018)

---

[21] T Körpınar, R C Demirkol *Int. J. Geom.*  
*Methods Mod. Phys.***15** 1850184 (2018)

---

[22] N Gürbüz *Int. J. Geom. Methods Mod.*  
*Phys.***12** 1550052 (2015)

---

[23] N Gürbüz *Int. J. Geom. Methods Mod.*  
*Phys.***14** 1750175 (2017)

---

- [24] D Y Kwon, F C Park and D P Chi *Appl. Math. Lett.***18** 1156 (2005)

---
- [25] T Körpınar *Z. Naturforsch. A***70** 477 (2015)

---
- [26] T Körpınar and E Turhan *Differ. Equ. Dyn. Syst.***21** 281 (2013)

---
- [27] T Körpınar *J. Dyn. Syst. Geom. Theor.***15** 15 (2017)

---
- [28] T Körpınar *J. Adv. Phys.***7** 257 (2018)

---
- [29] T Körpınar *Int. J. Theor. Phys.***54** 1762 (2015)

---
- [30] M Yeneroğlu and T Körpınar *J. Adv. Phys.***7** 292 (2018)

---
- [31] L R Bishop *Am. Math. Mon.***82** 246 (1975)

---
- [32] M P Carmo *Differential Geometry of Curves and Surfaces* (New Jersey: Prentice-Hall) (1976)

---

- [33] C Ekici, H Tozak and M Dede *J. Math. Anal.***8** 1 (2017)
- 
- [34] T Körpınar and R C Demirkol *Bull. Braz. Math. Soc. New Ser.***49** 159 (2018)
- 
- [35] T Körpınar, R C Demirkol and V Asil *Rev. Mex. Fis.***64** 176 (2018)
- 
- [36] T Körpınar and R C Demirkol *Rev. Mex. Fis.***63** 560 (2017)
- 

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### Cite this article

Körpınar, T. Optical Heisenberg ferromagnetic model for directional inextensible flows of spacelike curves with geometric phase. *Indian J Phys* **94**, 403–408 (2020).  
<https://doi.org/10.1007/s12648-019-01462-2>

Received

Accepted

Published

20 November  
2018

21 January 2019

19 April 2019

Issue Date

March 2020

DOI

<https://doi.org/10.1007/s12648-019-01462-2>

Keywords

**Quasi-frame**

**Inextensible flows**

**Curvatures**

**Heisenberg ferromagnetic model**

**Geometric phase**

PACS Nos.

**04.20.-q**

**03.50.De**

**02.40.-k**

[Home](#) > [Indian Journal of Physics](#) > [Article](#)Original Paper | [Published: 16 May 2019](#)

# Investigation on temperature-insensitive cavity systems for ultrastable lasers

[Long Chen](#) , [Linbo Zhang](#), [Chenhui Jiang](#), [Guanjun Xu](#),  
[Jun Liu](#) & [Tao Liu](#) [Indian Journal of Physics](#) **94**, 397–402 (2020)**137** Accesses | [Metrics](#)

## Abstract

The capability of optical reference cavities to resist ambient thermal fluctuations is significant in ultrastable laser systems especially applying in transportable system and space station. To reduce the deterioration of long-term laser frequency stability induced by temperature variation, the thermal response of cavities is investigated. The simulation and analysis indicate that the use of multiple enclosing thermal shields with a low emissivity allows a larger thermal time constant. The quantitative functional relationships between the thermal time constant and the heat capacity and surface emissivity of the passive thermal shields are firstly obtained using FEA simulation. Based on

these results, a temperature-insensitive cavity system is designed with a thermal time constant of approximately 680 h. According to the designed system, two different methods are used to evaluate the thermal performance. And mathematical expressions for the cavity temperature over time are obtained. The calculated thermal time constant is validated by the simulated results. The thermal sensitivity of the designed system is  $4.1 \times 10^{-11}$  and  $1.3 \times 10^{-5}$  when temperature variation period is 1 h and 24 h, respectively. The fractional length instability of the cavities induced by temperature fluctuation is  $8.2 \times 10^{-16}$  over an average time of 1 day, which can compete theoretically with fountain clocks.

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## References

- 
- [1] T M Fortier, N Ashby, J C Bergquist, M J Delaney, et al. *Phys. Rev. Lett.***98** 070801 (2007)
- 
- [2] I Ushijima, M Takamoto, M Das, T Ohkubo, and H. Katori *Nat Photonics***9** 185 (2015)
- 
- [3] B J Bloom, T L Nicholson, J R Williams, S L Campbell, et al. *Nature***506**, 71 (2014)
- 
- [4] N Hinkley, J A Sherman, N B Phillips, M Schioppo, et al. *Science***341** 1215 (2013)

- 
- [5] S G Turyshev *Phys. Uspekhi***52** 1 (2009)
- 
- [6] H Müller, S Herrmann, C Braxmaier, S Schiller and A Peters *Phys. Rev. Lett.***91** 020401 (2003)
- 
- [7] R W P Drever, J L Hall, F V Kowalski, J Hough, G M Ford, A J Munley and H Ward *Appl. Phys. B***31** 97 (1983)
- 
- [8] A D Ludlow, X Huang, M Notcutt, T Zanon-Willette, et al. *Opt. Lett.***32** 641 (2007)
- 
- [9] B C Young, F C Cruz, W M Itano, and J C Bergquist *Phys. Rev. Lett.***82** 3799 (1999)
- 
- [10] T Kessler, C Hagemann, C Grebing, T Legero et al. *Nat. Photonics***6** 687 (2012)
- 
- [11] T Nicholson, M Martin, J Williams, B Bloom et al. *Phys. Rev. Lett.***109** 230801 (2012)
- 
- [12] Y Y Jiang, A D Ludlow, N D Lemke, R W Fox et al. *Nat. Photonics***5** 158 (2011)
- 
- [13] S Hafner, S Falke, C Grebing, S Vogt et al.

*Opt. Lett.***40** 2112 (2015)

---

[14] J Zhang, W Wu, X H Shi, X Y Zeng and Z H Lu *Rev. Sci. Instrum.***87** 023104 (2016)

---

[15] C Hagemann *Ph.D. thesis* (University of Hannover, Germany) (2013)

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## Acknowledgements

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This work is supported by the Major Scientific Instruments and National Development Funding Projects of China (Grant No. 61127901), the Key Research Program of the Chinese Academy of Sciences (Grant No. KJZD-EW-W02), the ‘Cross and Cooperative’ Science and Technology Innovation Team Project of the Chinese Academy of Sciences (Grant No. (2012)119) and the Young Scientists Fund of the National Natural Science Foundation of China (Grant No. 11403031). And the work is also supported by Open Research Fund of State Key Laboratory of Transient Optics and Photonics, Chinese Academy of Sciences.

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### Cite this article

Chen, L., Zhang, L., Jiang, C. *et al.* Investigation on temperature-insensitive cavity systems for ultrastable lasers. *Indian J Phys* **94**, 397–402 (2020). <https://doi.org/10.1007/s12648-019-01483-x>