

## REVIEWER'S REPORT

Manuscript No.: IJAR-50466

Date:28.02.2025

**Title: Study of the Thermal Behaviour of an Inductor on a Toric Magnetic Circuit**

### Recommendation:

Accept after minor revision.....

Rating	Excel.	Good	Fair	Poor
Originality	✓			
Techn. Quality	✓			
Clarity	✓			
Significance		✓		

Reviewer Name:Dr.K.Arumuganainar

Date:28.02.2025

### Reviewer's Comment for Publication.

*(To be published with the manuscript in the journal)*

*The reviewer is requested to provide a brief comment (3-4 lines) highlighting the significance, strengths, or key insights of the manuscript. This comment will be Displayed in the journal publication alongside with the reviewers name.*

The study provides valuable insights into the thermal behavior of toric inductors, demonstrating the influence of geometric parameters on temperature distribution. However, to strengthen the paper, experimental validation, an expanded literature review, and improved readability should be considered. Overall, the research contributes to the field of electronic component thermal management and could be further refined for journal publication.

### *Detailed Reviewer's Report*

## Review Report

**Title:** Study of the Thermal Behaviour of an Inductor on a Toric Magnetic Circuit

**Summary:** The paper investigates the thermal behavior of an air inductance with a closed toric magnetic circuit (3C90). Using COMSOL software, the authors analyze the influence of geometric parameters on temperature distribution. The study employs a nodal thermal model to evaluate the impact of conductor thickness, the number of turns, and current on the inductor's thermal performance. The findings demonstrate a correlation between simulation and analytical calculations.

### Strengths:

1. **Relevance and Significance:** The study addresses an important issue in electronic component design—thermal management in inductors—which is critical for performance optimization.
2. **Methodology:** The use of COMSOL software for simulation provides a robust framework for analyzing thermal effects. The combination of simulation and analytical calculations strengthens the credibility of the results.
3. **Comprehensive Data Analysis:** The study considers various geometric parameters and presents detailed results, including tables and graphs that support the findings.
4. **Clear Presentation of Results:** The paper effectively presents temperature variations with respect to different parameters, providing useful insights into inductor design.

### Weaknesses:

1. **Literature Review:** While the paper references relevant works, a deeper discussion on recent advancements and alternative modeling techniques would enhance its contribution.
2. **Experimental Validation:** The study relies solely on simulation and analytical calculations. Experimental validation would add more reliability to the conclusions.
3. **Clarity and Readability:** Some sections, particularly the introduction and background, could be more structured to improve readability. Sentences are sometimes lengthy and difficult to follow.

4. **Figures and Tables:** Some figures lack clear captions and detailed descriptions. Enhancing the clarity of graphs and improving their resolution would make the results more interpretable.
5. **Comparative Analysis:** The paper could benefit from a comparison with other similar studies to highlight the uniqueness and effectiveness of the proposed model.

### **Recommendations:**

1. **Expand the Literature Review:** Provide a more detailed discussion of related works, including recent studies on thermal modeling of inductors.
2. **Include Experimental Results:** If feasible, conduct experimental tests to validate the simulation findings.
3. **Improve Readability:** Revise certain sections to enhance clarity and coherence.
4. **Enhance Figure Quality:** Ensure all figures are well-labeled and of high resolution to facilitate better interpretation.
5. **Comparison with Existing Models:** Provide a comparison with other modeling approaches to contextualize the advantages of the adopted method.

**Conclusion:** The study provides valuable insights into the thermal behavior of toric inductors, demonstrating the influence of geometric parameters on temperature distribution. However, to strengthen the paper, experimental validation, an expanded literature review, and improved readability should be considered. Overall, the research contributes to the field of electronic component thermal management and could be further refined for journal publication.

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### **Overall Rating: 7.5/10**

- **Originality:** 7/10
- **Technical Depth:** 8/10
- **Clarity and Structure:** 7/10
- **Relevance to Field:** 9/10
- **Experimental Validation:** 6/10