Review Form2

Book Name:	**Current Approaches in Engineering Research and Technology**
Manuscript Number:	**Ms_BPR_2557**
Title of the Manuscript:	**Machine-Learning-Based Compact Modeling for Sub-3-nm-Node Emerging Transistors**
Type of the Article	**Book Chapter**

PART 1: Review Comments

Compulsory REVISION comments	**Reviewer's comment**	**Author's Feedback***(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimumof 3-4 sentences may be required for this part.	This manuscript is significant for the scientific community as it introduces a novel approach to compact modeling using artificial neural networks (ANN) for sub-3-nm-node emerging transistors, specifically nanosheet FETs (NSFETs). By leveraging machine learning, the study presents a model that not only improves accuracy in predicting I-V and C-V characteristics but also significantly reduces simulation time compared to traditional compact models. The integration of the ANN-based model with Verilog-A and its application in SPICE simulations demonstrates its practical utility in advanced semiconductor design. I appreciate this manuscript for its innovative application of ML techniques in a critical area of device modeling, which has the potential to accelerate the development of next-generation nano-devices while reducing the complexity and time associated with traditional modeling methods	
Is the title of the article suitable? **(If not please suggest an alternative title)**	Yes, the title of the article, "Machine-Learning-Based Compact Modeling for Sub-3-nm-Node Emerging Transistors," is suitable. It clearly conveys the focus of the research, which is the application of machine learning techniques for compact modeling in the context of advanced, sub-3-nm-node transistors. The title effectively summarizes the key elements of the paper—machine learning, compact modeling, and emerging transistor technologies—making it relevant and informative for potential readers in the field	

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Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	The abstract of the article is quite comprehensive as it effectively summarizes the key points of the research, including the development of an ANN-based compact model for nanosheet FETs (NSFETs), the use of Sentaurus TCAD for data extraction, and the implementation of the model in Verilog-A. It also highlights the advantages of the proposed model in terms of accuracy, speed, and its comparison with existing models. However, there are a few suggestions to enhance the clarity and completeness of the abstract: 1. Clarify the Significance of the Model: The abstract could briefly mention the broader implications of the research, such as how the proposed model could impact the design and development of future semiconductor devices or reduce the time and cost of simulation in the industry. 2. Highlight Key Results: While the abstract mentions that the ANN model is faster and more accurate, it would be helpful to include specific quantitative results or improvements (e.g., "the proposed model is X times faster and Y% more accurate than existing models"). 3. Brief Mention of Limitations or Future Work: Including a sentence about the limitations of the current model or areas for future research would provide a more balanced view. For example, the potential for further improvements or the application of this model to other types of transistors could be mentioned. Suggested Revision: "In this paper, we present an artificial neural network (ANN)-based compact model for evaluating the characteristics of nanosheet field-effect transistors (NSFETs), a promising next-generation nano-device. Using the Sentaurus TCAD simulator, we extract data that accurately reflects the physical characteristics of NSFETs. Our ANN model, implemented in Verilog-A, predicts device currents and capacitances with high accuracy and efficiency using five key geometric parameters and two voltage biases. Extensive experiments demonstrate that the proposed model is several times faster and more accurate than existing compact models, significantly reducing simulation time while maintaining high precision. This advancement has the potential to accelerate the design of sub-3-nm transistors, thereby lowering development costs and time. Future work will explore the application of this model to other emerging transistor technologies and the further optimization of simulation speed and accuracy." These adjustments would provide a more comprehensive and informative abstract, making it more appealing and useful to potential readers.	
Are subsections and structure of the manuscript appropriate?	The subsections and structure of the manuscript are well-organized and appropriate, following a logical flow that guides the reader through the research. The paper effectively starts with an introduction and related work, which provide context and establish the significance of the study. The sections on device design, ANN model architecture, and methodology are detailed, allowing for a clear understanding of the technical aspects. The subsequent sections on model training, results, and SPICE simulations demonstrate the practical application and validation of the proposed model. To enhance the manuscript, ensuring consistency in subsection titles and possibly adding a brief discussion section could be beneficial. This would allow for a more explicit comparison of results with existing models and a deeper exploration of the study's implications. Overall, the structure supports the content well, making the research accessible and comprehensible.	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimumof 3-4 sentences may be required for this part.	This manuscript is scientifically robust and technically sound because it employs a well-established methodology, using artificial neural networks (ANN) to model the I-V and C-V characteristics of nanosheet FETs, a critical area in semiconductor research as devices scale down to sub-3-nm nodes. The use of Sentaurus TCAD for data extraction ensures that the ANN model is grounded in accurate physical simulations, which enhances the reliability of the results. Additionally, the paper provides a thorough comparison between the proposed ANN-based compact model and existing models, demonstrating significant improvements in both accuracy and speed. The practical implementation in Verilog-A and the successful SPICE simulations further validate the scientific and technical contributions of the research.	

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Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. **-**	**No**	
Minor REVISION comments **Is the language/English quality of the article suitable for scholarly communications?**	Yes	
Optional/Generalcomments		

PART 2:

	Reviewer's comment	**Author's comment***(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

Reviewer Details:

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