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Speech subject: TO-Based Design Optimization Methods for SiC MOSFET Power Modules

Speech leader: Gaojia Zhu, Asso. Prof., Tiangong University

Speech Description/Objective:

To enhance the working performances and the reliability of SiC MOSFET power modules, different optimization techniques have been implemented. However, as most optimization strategies can only optimize the numbers and sizes and do nothing about the components' shapes and structures, it is very difficult to break through the restrictions of engineering experiences. The topology optimization (TO) technique can create very novel structures that might not exist in the current industry and thus has attracted a lot of research attentions. In this regard, we wish to present some of our previous works on TO-based design optimizations together with the newly developed methodologies for power modules.

Speech Outline:

1. Introduction to topology optimization (TO) method
2. Spacer shape design for double-sided-cooled power modules based on TO
3. Design optimization method for power modules' heat sinks based on TO
4. A neural-network-(NN)-based fast iteration method for TOs of power modules
5. Conclusion

Who Should Attend:

Researchers related to the design, packaging, and thermal management of power modules

Introduction of Speaker:

Gaojia Zhu received the Ph.D. in Electrical Engineering with the Best Thesis Award from the National Engineering Research Center for Rare-Earth Permanent Magnet Machines, Shenyang University of Technology (SUT), Shenyang, China, in 2017, and the Bachelor in Applied Physics with Merit Student Award also from SUT in 2011. He joined Tiangong University (TGU), Tianjin, China, in 2018, where he is currently an associate professor. He was a visiting researcher to Prof. W. N. Fu's group at The Hong Kong Polytechnic University, Hong Kong, China, in 2018, and a postdoctoral visiting researcher to Prof. Chirs Gerada's team at the Power Electronics, Machines, and Control (PEMC) group, University of Nottingham, from 2022 to 2023.

He has published more than 30 refereed journal articles and 10 refereed conference papers, plus 6 conference presentations. He has served twice as the guest editor for special issues of high-impact journals. He is also the reviewer for several journals and conferences such as IEEE TIE, IEEE TEC, IEEE TVT, IEEE TAS, IET EPA, etc. His current research interest includes the multi-physical analysis and multi-disciplinary design optimization of power modules.