Amir Sajjad Bahman
Associate Professor
AAU Energy
The Faculty of Engineering and Science
Applied Power Electronic Systems
Applied Power Electronic Systems
EMI/EMC in Power Electronics
Reliability of Power Electronic Components
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Research profile

Biography

Amir Sajjad Bahman (Senior Member, IEEE) is an Associate Professor at the Center of Reliable Power Electronics (CORPE), Aalborg University, Denmark. His research interests include electro-thermo-mechanical modeling, packaging, and reliability of power electronic systems and components. Dr. Bahman received a B.Sc. from Iran University of Science and Technology, in 2008, an M.Sc. from Chalmers University of Technology, Sweden in 2011, and a Ph.D. from Aalborg University, Denmark, in 2015 all in electrical engineering. He was a Visiting Scholar in the Department of Electrical Engineering, University of Arkansas, USA, in 2014. Moreover, he was with Danfoss Silicon Power, Germany in 2014 as the Thermal Design Engineer. Dr. Bahman is a senior member of the IEEE and currently serves as an Associate Editor for the IEEE Transactions on Transportation Electrification and Elsevier Microelectronics Reliability.

Vice Leader of Reliability of Power Electronic Components Research Group (REPEC)

Coordinator and Lab Manager of the Danish Power Electronics Reliability Test Facilities (X-Power)

Positions

Associate Professor in Reliable Power Electronics, AAU Energy, Aalborg University, 2020 – present

Assistant Professor in Reliable Power Electronics, AAU Energy, Aalborg University, 2017 – 2020

Postdoctoral Fellow in Reliable Power Electronics, AAU Energy, Aalborg University, 2015 – 2017

Ph.D. Fellow in Reliable Power Electronics, AAU Energy, Aalborg University, 2012 – 2015

Visiting Scholar, Mixed-Signal Computer-Aided Design Research Lab, University of Arkansas, USA, 2014

Thermal Engineer, Danfoss Silicon Power, Germany, 2014

Research interests

Reliability and lifetime prognostics of power electronic systems and components

WBG devices and applications in power electronics converters

Physics-of-failure and fatigue analysis of power electronic components

Multiphysics modeling of power electronic systems

CFD and thermal management of power electronics

Employment

Associate Professor

Associate Professor
AAU Energy
The Faculty of Engineering and Science
Aalborg Øst, Denmark
1 Nov 2012 → 31 Dec 4712

Associate Professor
Associate Professor
The Faculty of Engineering and Science
Aalborg Øst, Denmark
1 Nov 2012 → 31 Dec 4712

Applied Power Electronic Systems
The Faculty of Engineering and Science
Aalborg Øst, Denmark
1 Jan 2021 → present

Associate Professor
Associate Professor
Applied Power Electronic Systems
The Faculty of Engineering and Science
Aalborg Øst, Denmark
1 Nov 2012 → 31 Dec 4712

EMI/EMC in Power Electronics
The Faculty of Engineering and Science
Aalborg Øst, Denmark
1 Jan 2021 → present

Reliability of Power Electronic Components
The Faculty of Engineering and Science
Aalborg Øst, Denmark
1 Jan 2021 → present

Research outputs

Failure mechanism analysis of fuses subjected to manufacturing and operational thermal stresses
Bahman, A. S., Jensen, S. M. & Iannuzzo, F., Sept 2018, In: Microelectronics Reliability. 88-90, p. 304-308 5 p.

Computer-aided engineering simulations
Bahman, A. S. & Iannuzzo, F., Jun 2018, *Wide Bandgap Power Semiconductor Packaging: Materials, Components, and Reliability.* Suganuma, K. (ed.). Woodhead Publishing, p. 199 - 223 25 p. (Elsevier).

A Lumped Thermal Model Including Thermal Coupling and Thermal Boundary Conditions for High Power IGBT Modules
Bahman, A. S., Ma, K. & Blaabjerg, F., Mar 2018, In: I E E E Transactions on Power Electronics. 33, 3, p. 2518 - 2530 13 p., 7903728.

Modeling of Short-Circuit-Related Thermal Stress in Aged IGBT Modules
Bahman, A. S., Iannuzzo, F., Uhrenfeldt, C., Blaabjerg, F. & Munk-Nielsen, S., Sept 2017, In: I E E E Transactions on Industry Applications. 53, 5, p. 4788 - 4795 8 p.

Reliability-oriented environmental thermal stress analysis of fuses in power electronics
Bahman, A. S., Iannuzzo, F., Holmgaard, T., Nielsen, R. Ø. & Blaabjerg, F., Sept 2017, In: Microelectronics Reliability. 76-77, p. 25-30 6 p.

Fuse Modeling for Reliability Study of Power Electronic Circuits
Bahman, A. S., Iannuzzo, F. & Blaabjerg, F., Mar 2017, *Proceedings of the 2017 IEEE Applied Power Electronics Conference and Exposition (APEC).* IEEE Press, p. 829-836 8 p. (IEEE Applied Power Electronics Conference and Exposition (APEC)).

A 3D Lumped Thermal Network Model for Long-term Load Profiles Analysis in High Power IGBT Modules
Bahman, A. S., Ma, K., Ghimire, P., Iannuzzo, F. & Blaabjerg, F., Sept 2016, In: I E E E Journal of Emerging and Selected Topics in Power Electronics. 4, 3, p. 1050 - 1063 14 p.

Mission-profile-based stress analysis of bond-wires in SiC power modules
Bahman, A. S., Iannuzzo, F. & Blaabjerg, F., Sept 2016, In: Microelectronics Reliability. 64, p. 419–424 6 p.

Optimization Tool for Direct Water Cooling System of High Power IGBT Modules
Bahman, A. S. & Blaabjerg, F., Sept 2016, *Proceedings of the 18th European Conference on Power Electronics and Applications (EPE'16 ECCE-Europe), 2016.* IEEE Press, 10 p.

Prediction of Short-Circuit-Related Thermal Stress in Aged IGBT Modules
Bahman, A. S., Iannuzzo, F., Uhrenfeldt, C., Blaabjerg, F. & Munk-Nielsen, S., Sept 2016, *Proceedings of IEEE Energy Conversion Congress and Exposition (ECCE), 2016.* IEEE Press, 7 p.

Electrical Parasitics and Thermal Modeling for Optimized Layout Design of High Power SiC Modules
Bahman, A. S., Blaabjerg, F., Dutta, A. & Mantooth, A., Mar 2016, *Proceedings of the 31st Annual IEEE Applied Power Electronics Conference and Exposition (APEC).* IEEE (Institute of Electrical and Electronics Engineers), p. 3012 - 3019 8 p.

General 3D Lumped Thermal Model with Various Boundary Conditions for High Power IGBT Modules
Bahman, A. S., Ma, K. & Blaabjerg, F., Mar 2016, *Proceedings of the 31st Annual IEEE Applied Power Electronics Conference and Exposition (APEC).* IEEE (Institute of Electrical and Electronics Engineers), p. 261 - 268 8 p.

Multidisciplinary Modelling Tools for Power Electronic Circuits: with Focus on High Power Modules
Bahman, A. S., Nov 2015, Department of Energy Technology, Aalborg University. 151 p.

A Novel 3D Thermal Impedance Model for High Power Modules Considering Multi-layer Thermal Coupling and Different Heating/Cooling Conditions
Bahman, A. S., Ma, K. & Blaabjerg, F., Mar 2015, *Proceedings of the 2015 IEEE Applied Power Electronics Conference and Exposition (APEC).* IEEE Press, p. 1209-1215 7 p. (I E E E Applied Power Electronics Conference and Exposition. Conference Proceedings).

Thermal Impedance Model of High Power IGBT Modules Considering Heat Coupling Effects
Bahman, A. S., Ma, K. & Blaabjerg, F., Nov 2014, *Proceedings of the 2014 International Power Electronics and Application Conference and Exposition (PEAC2014).* IEEE Press, p. 1382-1387 6 p.

FEM Thermal Modeling and Improvement for High Power IGBT Modules Used in Wind Turbine Systems
Bahman, A. S., Ma, K. & Blaabjerg, F., Oct 2014, *Proceedings of the International Conference on Wind energy Grid-Adaptive Technologies, WEGAT 2014.* Chungbuk University, Korea, p. 1-7 7 p.

Loss comparison of different nine-switch and twelve-switch energy conversion systems
Bahman, A. S., Loh, P. C., Qin, Z. & Blaabjerg, F., Mar 2014, *Proceedings of the 2014 29th Annual IEEE Applied Power Electronics Conference and Exposition (APEC).* IEEE Press, p. 309-314 6 p. (I E E E Applied Power Electronics Conference and Exposition. Conference Proceedings).

Comparison between 9-level hybrid asymmetric and conventional multi-level inverters for medium voltage application
Bahman, A. S. & Blaabjerg, F., 2013, *Proceedings of the 2013 IEEE International Symposium on Industrial Electronics (ISIE).* IEEE Press, p. 1-7 7 p. (Industrial Electronics (ISIE), IEEE International Symposium on).

Awards

HiPower 5.0: Leading edge Semiconductor, Integration, and Control System Technologies for highly compact and smart eDrive Components towards more sustainable Power Electronics 5.0

Bahman, A. S. (PI), Zhou, D. (CoPI), Sadeghi, S. (Project Participant) & Steffensen, B. (Project Coordinator)
European Commission: DKK123,951,651.00
01/07/2025 → 30/06/2028

Projects

AMCOOL: Advanced Module Cooling
Bahman, A. S. (PI), Sadeghi, S. (Project Participant), Du, S. (Project Participant) & Steffensen, B. (Project Coordinator)
EUDP
01/01/2025 → 31/12/2027

APETT: Advanced Power Electronic Technology and Tools
Blaabjerg, F. (PI), Munk-Nielsen, S. (CoI), Iannuzzo, F. (Project Participant), Wang, H. (Project Participant), Uhrenfeldt, C. (Project Participant), Beczkowski, S. M. (Project Participant), Zhou, D. (Project Participant), Choi, U. (Project Participant), Jørgensen, A. B. (Project Participant), Vernica, I. (Project Participant), Sangwongwanich, A. (Project Participant), Christensen, N. (Project Participant), Ceccarelli, L. (Project Participant), Nielsen, C. K. (Project Participant), Bahman, A. S. (Project Participant), Pedersen, K. (Project Participant), Pedersen, K. B. (Project Participant) & Kristensen, P. K. (Project Participant)
Innovation Fund Denmark
01/01/2017 → 30/06/2021

ALL2GaN: Affordable smart GaN IC solutions as enabler of greener applications
Bahman, A. S. (PI), Zhou, D. (PI), Iannuzzo, F. (PI), Novak, M. (Project Participant), Sangwongwanich, A. (Project Participant), Zhao, S. (Project Participant), Zhang, K. (Project Participant), Du, S. (Project Participant), Steffensen, B. (Project Coordinator) & Frøstrup, S. (Project Coordinator)
Horizon - Chips Joint Undertaking
01/05/2023 → 30/04/2026

Condition Monitoring & Remaining Useful Life Estimation for Power Electronic Components
Loghmani Moghaddam Toussi, A. (PI), Bahman, A. S. (Supervisor), Blaabjerg, F. (Supervisor) & Iannuzzo, F. (Supervisor)
01/06/2019 → 30/06/2023

ELMAC: Electronics Manufactured for Climate
Bahman, A. S. (PI), Iannuzzo, F. (PI), Blaabjerg, F. (CoI), Wang, H. (CoI), Török, L. (Project Participant), Zhang, K. (Project Participant) & Xue, P. (Project Participant)
Department of Energy Technology
01/06/2019 → 01/12/2023

TEAMING: e-powerTrain prEdictive mAintenance using physics inforMed learnING
Zhao, S. (PI), Wang, H. (Project Participant), Blaabjerg, F. (Project Participant), Bahman, A. S. (CoPI), Sangwongwanich, A. (Project Participant) & Frøstrup, S. (Project Coordinator)
Horizon Europe
01/01/2024 → 31/12/2027

MERSEN: Fatigue reliability of fuses
Bahman, A. S. (PI), C, P. (Project Participant) & Frøstrup, S. (Project Coordinator)
Mersen France SB SAS
15/11/2021 → 14/05/2023

HiPower 5.0: Leading edge Semiconductor, Integration, and Control System Technologies for highly compact and smart eDrive Components towards more sustainable Power Electronics 5.0
Bahman, A. S. (PI), Zhou, D. (CoPI), Sadeghi, S. (Project Participant) & Steffensen, B. (Project Coordinator)
European Commission, Innovation Fund Denmark
01/07/2025 → 30/06/2028

WOODWARD: Modelling and Optimization of the Water Cooling System for the Wind Power Converter
Bahman, A. S. (PI) & Blaabjerg, F. (Project Participant)
Woodward Kempen GmbH
01/04/2017 → 30/03/2018

Multi-Time Scale Modelling of Power Electronic Converters in Power System Applications
Fogsgaard, M. B. (PI), Bahman, A. S. (Supervisor), Blaabjerg, F. (Supervisor) & Iannuzzo, F. (Supervisor)
01/09/2019 → 31/08/2022

AIRBUS: Reliability Evaluation and Health Monitoring for Aircraft Converters (ZEROe Project)
Bahman, A. S. (PI), Wei, X. (Project Participant) & Steffensen, B. (Project Coordinator)
01/12/2023 → 31/05/2025

Thermal Management of Power Electronics - with Focus on Forced Convection and Two Phase Cooling Applications
Nujukambari, A. Y. (PI), Bahman, A. S. (Supervisor), Sørensen, H. (Supervisor) & Hærvig, J. (Supervisor)
15/12/2018 → 14/12/2021

X-POWER – Power Electronics Reliability Test Facilities
Blaabjerg, F. (PI), Bahman, A. S. (CoI), Iannuzzo, F. (CoI), Wang, H. (CoI), Zhang, K. (Project Participant), Steffensen, B. (Project Coordinator) & Ravn, T. K. (Project Coordinator)
Uddannelses- og forskningsministeriet
01/01/2019 → 31/12/2023