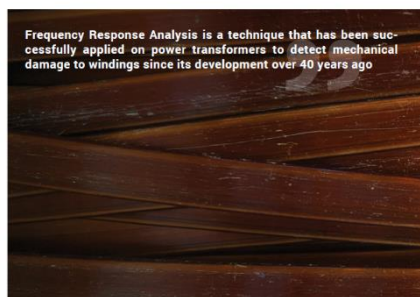


University Transformer Research Alliance

Chair's Report (2022-2023)

UTRA COLUMN



Frequency Response Analysis is a technique that has been successfully applied on power transformers to detect mechanical damage to windings since its development over 40 years ago

A review of transformer FRA measurement and diagnosis techniques

Column by the University Transformer Research Alliance (UTRA) www.university-transformer-research.com



ABSTRACT
Frequency Response Analysis (FRA) is a successful technique to detect mechanical damage in power transformers with greater sensitivity than other measurements. The FRA method is commonly used today and requires a benchmark FRA measurement for comparative diagnostic methods. The use of numerical indices to quantify differences in two FRA signatures is described. It is important to understand the importance of understanding the physical meaning behind the frequency responses of windings through modelling and simulation.

KEYWORDS:
Frequency Response Analysis, Sweep Frequency Response Analysis, Windings, Numerical Indices, FRA Interpretation

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The University Transformer Research Alliance (UTRA) was established in February 2019 and consists of six internationally leading transformer research groups from the UK, Germany, China and Australia, with the aim to enable the synergic benefits in pursuit of the advancement of knowledge in the areas of transformer related research, and through research leadership, strategic research direction and guidance, engaging stakeholders and recognising young talent.

Over the past four years, the members of UTRA have dedicated significant efforts towards promoting the alliance and enhancing our reputation through a range of activities. These include engaging in joint publications, organizing the highly successful UTRA conference, and maintaining an informative and user-friendly UTRA website. As a result, we have witnessed a remarkable growth in the number of visitors to our website, with the total count now surpassing 174,000.

Over the past year, UTRA has been highly active, holding a total of seven meetings to drive progress in various aspects of our organization. Notably, the third UTRA conference, held in November 2022, was a resounding success. Prof. Yang Xu, Co-Chair, led the organization of this conference, which took place online and featured six presenters from member universities. The event attracted nearly 50 participants. Following a highly competitive selection process, Mr. Haichuan Yu from the University of Manchester emerged as the winner of the prestigious "Best Presentation Award."



In addition to the conference, UTRA members have also been actively involved in publishing. This year, the University of Exeter led the publication of a UTRA column titled "A Review of Transformer FRA Measurement and Diagnosis Techniques," with valuable contributions from other members. This publication showcases our collaborative efforts and commitment to advancing knowledge in the field.

Furthermore, our members have continued to collaborate and engage in research and dissemination activities, as exemplified by Prof. Stefan Tenbohlen's recent contribution. Prof. Tenbohlen delivered a CPD (Continuing Professional Development) Webinar on "Partial Discharge Measurement on Power Transformers" at the University of Queensland, further demonstrating our dedication to sharing expertise and fostering professional growth within the UTRA community.

The previous year proved to be highly significant for UTRA, marked by the accomplishment of a key milestone—the implementation of the "Associate Membership Criteria." This achievement has enabled us to expand our membership by welcoming research teams with strong expertise in

transformer-related research. As we look ahead, I am pleased to announce that we have approved two applications from distinguished institutions: Universiti Putra Malaysia in Malaysia and Université du Québec à Chicoutimi (UQAC) in Canada. These applications were put forward by Prof. Zhongdong Wang, and I am confident that the new Associate members, Dr. Norhafiz Aziz and Prof. Issouf Fofana, along with their teams, will make valuable contributions to UTRA in the years to come. We anticipate their successful transition to permanent members within an appropriate timeframe.

The time has come for me to pass on the leadership of UTRA to Prof. Yang Xu from Xi'an Jiaotong University, who will assume the role of Chair. Alongside Prof. Xu, I warmly welcome Dr. Qiang Liu from the University of Manchester as the new Co-Chair. I have complete confidence in their abilities to guide UTRA throughout 2022 and beyond, and I extend my heartfelt wishes for their every success in this endeavour.

I would also like to take this opportunity to express my sincere gratitude to all the members of UTRA and their dedicated teams for their unwavering hard work and support throughout this year. It is through your collective efforts that UTRA has achieved remarkable progress and accomplishments. Your dedication and commitment have been instrumental in shaping the success of our organization.

Prof Tapan Saha

UTRA chair in 2022