IEEE/PES Transformers Committee - Spring 2002 Meeting
Vancouver, B.C., Canada - April 14-18, 2002

IEEE is an authorized CEU provider of the
International Association for Continuing Education & Training (IACET)

Different Aspects of Frequency Response Analysis (FRA)

Larry Coffeen, Charles Sweetser

1. Abstract

Frequency Response Analysis (FRA) testing has become a valuable tool for verifying the geometric integrity of electrical apparatus, especially transformers. The FRA technique provides internal diagnostic information by non-intrusive procedures. This presentation presents the general concepts, current techniques, and analysis strategies associated frequency response analysis testing. Frequency response analysis testing is accomplished either by the sweep frequency method or the impulse method; both methods will be compared. Additionally, another FRA method will be discussed that uses enhancements to the traditional impulse method.

2. Learning Objectives

The primary objective of the presentation is to provide the participants with the basic understanding regarding the application and analysis of frequency response analysis. The presentation will focus on the following issues:

- FRA Fundamentals - The presentation will introduce FRA fundamentals as they relate to test application and analysis.

- Test Methods - Two traditional test methods have evolved, which include the sweep frequency method and the impulse method. Both the sweep frequency method and the impulse method will be discussed and compared. A new prototype method will be also discussed.

- Analysis Strategies - Interpretation of the data is often subjective. Various analysis strategies exist. The presentation will investigate different strategies and options.

3. Learning Outcomes

The participants should gain an understanding for frequency response analysis, including test application and analysis. The understanding should provide the participants with a new valuable diagnostic tool for verifying the internal integrity of power transformers.

4. Presenter's Biographies

Larry Coffeen: Larry is a Research Engineer for NEETRAC, a research organization consisting of manufacturers and utilities in the electric power industry. NEETRAC is also a part of the school of Electrical and Computer Engineering at Georgia TECH. Larry's current work includes the development of test techniques and dedicated test equipment to predict imminent failure in transmission power transformers and polymer insulators. Before joining NEETRAC, he was employed for 29 years by Georgia Power Company. As a Senior Test engineer, he was involved in Transmission Substation Testing and High Voltage Testing until the formation of NEETRAC in January of 1996. He received a Bachelor of Electrical Engineering degree from The Georgia Institute of Technology in 1970. He is a member of the IEEE Power System Instrumentation and Measurements Committee of the Power Engineering Society and a member of the IEEE Power Electronics Society. He was awarded the 1997 PES Working Group Award for IEEE Std 4-1995, and he has two patents pending on power transformer frequency response analysis.

Charles "Chuck" Sweetser: Born in Maine, USA, Chuck received both a B.S. of Electrical Engineering in 1992 and a M.S. of Electrical Engineering in 1996 from the University of Maine. He joined Doble Engineering Company, Watertown, MA, in 1996, where he presently holds the position of Principal Research and Development Engineering. His responsibilities include the development of diagnostic techniques and test methodologies for power apparatus. His current interests include frequency response analysis and thermal modeling of power transformers.