ONLINE ASSESSMENT OF MOISTURE IN POWER TRANSFORMER INSULATIONS

IITM Technology Available for Licensing

Problem Statement

- The insulation in a power transformer must be clean & non contaminated, without any moisture or gases. Assessing the moisture content in insulation is thus a key factor to ensure transformer reliability & longevity.
- In the prior art, it is noted that **moisture** is **measured using offline methods** which required taking the **transformer off** the power line, which may not be desirable.
- The drawbacks encountered in the prior arts are listed herein: 1. The transformer needs to be **taken off** the **power line** during measurement and then the measurement may be done at periodic intervals say during servicing of the transformer. 2. Such periodic measurements may **miss spikes** in the **moisture content** of the **insulation** caused by weather conditions including others.
- Hence, there is a need to address above issues.

Technology Category/ Market

Technology: System & method for measuring moisture in power transformer;
Industry: Energy, Power transformers, Instrument transformers, OIP insulation;
Applications: Power transformers, Instrument transformers, OIP insulation;
Market: The global power transformer market is projected to reach **$61.95B by 2030**, growing at a **CAGR** of **7.9%** during the forecast period (2021-**2030**).

Technology

- Present patent claimed a **method and system** for **online moisture assessment** in the **insulation** of a **transformer**, accessible for **external monitoring** (Refer FIG.1).
- Further the patent describes power transformers and more particularly to **measure moisture in insulations of power transfer**.
- The system comprises a current transformer, a moisture sensing apparatus placed in proximity to the current transformer comprises alternating layers of insulation & foil, a voltage source connected to the moisture sensing apparatus, a frequency domain spectrometer connected to said moisture sensing apparatus & the power transformer.

Images

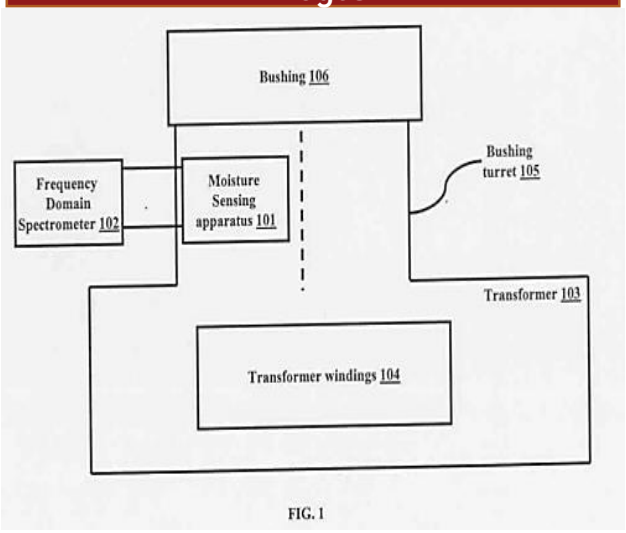

Fig.1: Illustrates a system for measuring moisture in the insulation of a power transformer

Intellectual Property

IITM IDF Ref. 808;
Patent No: 416718 (Granted)

TRL (Technology Readiness Level)

TRL- 2/3, Proof of Concept ready & validated

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Images (Experimental Images)

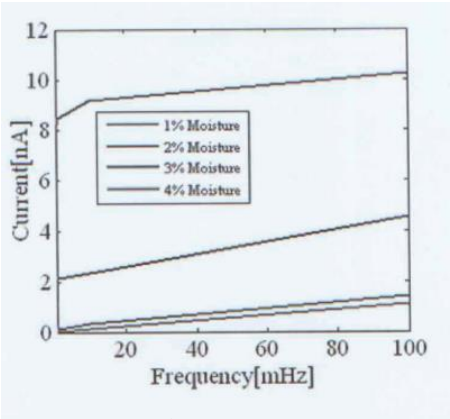

Figure 2: Illustrates the graphical representation of typical variation of the current against variations in frequency;

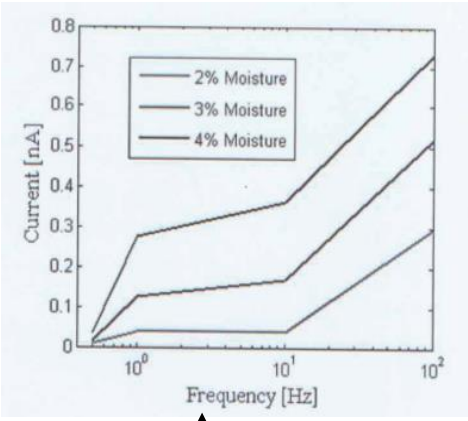

Figure 3: Illustrates the graphical representation of typical variation of the current against the percentage of moisture present within the moisture sensing apparatus;

Key Features / Value Proposition

❖ ***Technical Perspective:***

1. The frequency domain spectrometer connected to the **moisture sensing apparatus** configured to **determine a current across the moisture sensing apparatus** against **a frequency of the voltage signal** based on a loss component in the moisture sensing apparatus and the power transformer.
2. The frequency domain spectrometer applies frequencies from **0.1mHz to 1kHz** across said alternating layers of insulation and foil, and plots current in said alternating layers of insulation and foil as a function of applied frequency. (Refer Figs. 2 and 3)
3. The moisture may be **monitored by monitoring tanδ** in the moisture sensing apparatus and the transformer, which provides a signal proportional to tanδ.

❖ ***Industrial Perspective:***

1. Provides a cost-effective system in **simple design, reliable,** & mitigate other issues in efficient manner.

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