Exercises on High Voltage Engineering (April 17, 2025)

Lecture 9: Insulation Test and Diagnosis (1)

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**Exercise 5-6: 当用并联等效电路代表有损耗的试品绝缘时，请推导出如教材式 5-4（P144）、式 5-5（P145）所示的结果。**

一張含有 文字, 筆跡, 字型, 數字 的圖片

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**Exercise 5-8: 正接法和反接法西林电桥各应用在什么条件下？**

(1) Direct Schering Bridge: The test object must be insulated from the ground. This is usually easy to achieve when testing materials and small equipment in the laboratory.

(2) Reverse Schering Bridge: In field tests, many test objects have one end grounded, making it impossible to insulate them from the ground. In such cases, only the grounding point of the bridge circuit can be modified.

**Exercise 5-10: 在现场，由于条件限制和干扰严重等原因，通常给局部放电试验造成比较大的困难，能否通过测量电介质损耗角正切𝐭𝐚𝐧 𝜹的办法来间接反映设备是否存在局部的放电性故障**

It can serve as an indirect indicator. When partial discharge occurs, the dielectric loss increases, leading to a corresponding rise in the tangent of the loss angle.

**Exercise 5-11: 对某高压设备进行电介质损耗角正切测量时，发现设备的𝐭𝐚𝐧 𝜹随着外加电压的增大而显著增大，请问该高压设备是否有可能存在局部放电性故障？**

It may exist. When partial discharge occurs, the dielectric loss increases, resulting in a corresponding increase in the dissipation factor (tan δ).

**Exercise 5-12: 常测量“视在局部放电量”这一指标。它是什么含义？试用电介质三电容模型，推导说明视在放电电荷量𝒒与电介质中真实放电电荷量𝒒𝒓之间的关系。一台 500kV 电力变压器新产品在实验室中的 PD 放电量允许值约为多少？**

(1) This refers to the externally observable indirect measurement of the actual discharge occurring at the defect site. It represents the total change in charge (ΔQ) on the test object's capacitance corresponding to an applied voltage variation (ΔU).

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