



Very Fast Transient Overvoltages Mitigation System

Parallel RLC Resonator Circuit

CONTEXT

Switching of Bus-charging currents are common operations in HV substations normally performed by the disconnectors (DS), it consists on the switching operation of an AC voltage source from an unloaded section of busbar and it causes several dielectric breakdowns to occur across the gap during the swtiching process.

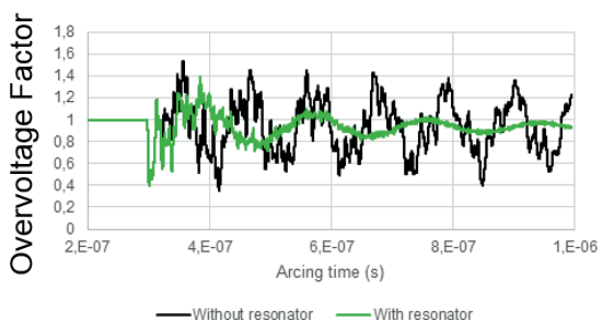
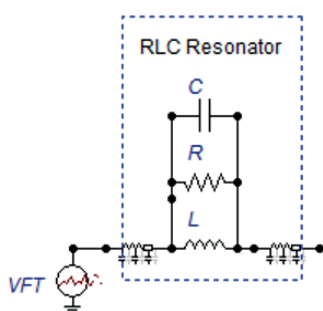
These breakdowns produce the so called Very Fast Transient Overvoltages (VFTO) phenomena that travels towards all of the connected equipment. VFTOs are of special concern in UHV-Gas Insulated Substations because they reach voltages values close or higher than the rated Ligthning Impulse Withstand Voltage putting the phase-to-earth insulation systems of the disconnector and adjacent equipment in jeopardy. VFTOs normally last less than $5\mu\text{s}$ but several hundreds of them are produced at every breaking/making operation.

TECHNOLOGY DESCRIPTION

The proposed device is a parallel RLC resonating circuit tuned to the main frequency of VFTO able to temporary store its energy and slowly dissipate it into the resistance. This device is highly compact and practically invisible for the network in normal operation.

The resistor doubles up as the capacitor reducing footprint and making it easy to install inside the busbar. According to calculations, it could reduce VFTO up to 50% if correctly sized.

Calculated comparison of VFTO with and without resonator



APPLICATION DOMAIN

UHV -AC Substations
Transients Overvoltage Protection for Disconnectors

ADVANTAGES

- *Cost-Effective
- *Easy to Implement
- *Compact and fully compatible with existing GIS

TRL SCALE



Transient electromagnetic calculations used to calculate performance in real GIS model

DELIVERABLES

Technical and test reports
Plans and relevant sizing information
Patent application PCT/FR2018/050160