

Simulations to verify projects

The simulations allowed us to verify the correct insulation coordination of a high voltage Gas Insulated Station (GIS).

Case Study no. 11: Very-fast-front overvoltages

1. Summary

The purpose of the study was verifying the severity of the very-fast-front overvoltages in a high voltage Gas Insulated Station (GIS), due to switching, that can damage the transformers.

Calculated transients on HV GIS substation did not put into evidence any critical overvoltage values. The results shows negligible surges and we can conclude that no fault due to disconnectors/circuit-breaker should be experienced!

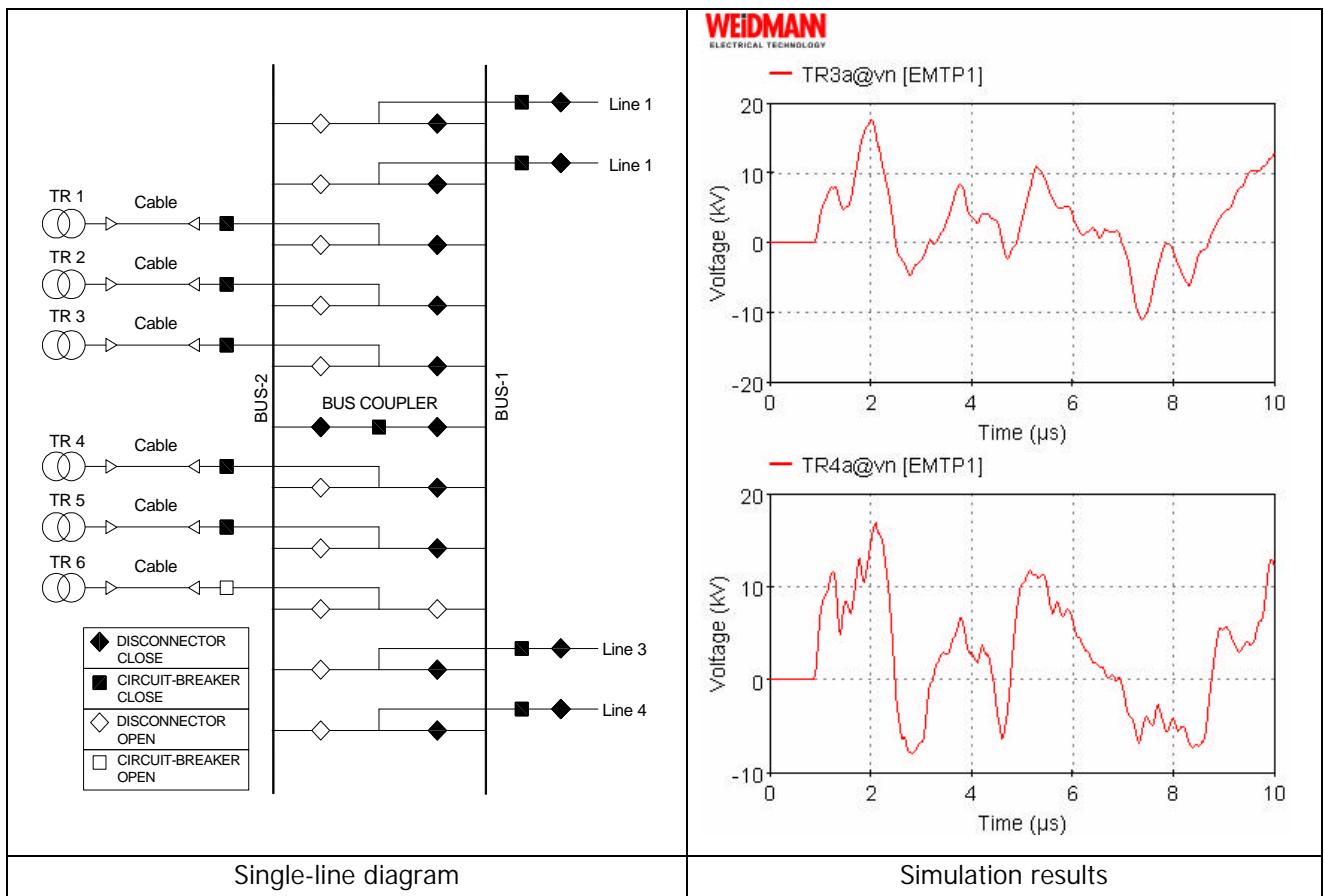
2. Description

Disconnecter switching operation in a GIS may produce fast transient overvoltages due to the voltage collapse across the poles at striking. The overvoltage shape is formed by the multiple reflections and refractions of the steps at all points where impedance changes are encountered.

3. Technical challenge

- The presence of elements like transformers, cables, etc. in the circuit, and the configuration of the substation itself, may affect the voltage transient considerably.
- The behavior of most of network components is of capacitive nature and also short length conductors must be regarded as transmission line sections upon which voltage waves propagate with a given velocity.
- Many electrical components may exhibit a completely different behavior with respect to the normal behavior at power frequency.

4. Results



The highest value obtained was only about 1.23 p.u. (in case of very unlikely operation) and the encountered frequencies, about 14 MHz, as expected.

5. Conclusions

Simulations have shown that no countermeasures are needed in order to avoid the occurrence of overvoltages or to limit them.