The PSCAD Component “Reignition”

1. Introduction

This component is designed to simulate the reignition phenomena during the breaker open operation.

![Diagram of the reignition component]

Figure 1 shows the component “reignition”. There are three input and one output signals:

“u” (real): the voltage across the breaker, i.e., the arc voltage.

“i” (real): the breaker current, i.e., the arc current.

“contact part” (integer): the signal indicates the contact parts (arching starts). When it turns to 1 from 0, the contact starts separate.

“open” (integer): output signal to control an ideal breaker. When it is 0, the break is close, when it turns to 1, the breaker will open immediately.

![Breaker arc input parameters]

Figure 2 “breaker arc” input parameters
Input parameters:

**General information**

- **Breaker arc name**
  - text: the name of the breaker name.
- **Current chopping level (kA)**
  - real: the current chopping level.
- **Rate of rise if the dielectric strength (kV/s)**
  - real
- **TRV just before current zero (kV)**
  - real
- **The rate of rise of VCB HF quenching capability (kA/s²)**
  - real
- **Quenching capability just before the contact separation (kA/s)**
  - real

2. **Example of reignition/current chopping**

![Figure 3 circuit of current chopping and reignition](image)

A simple example is created in PSCAD to demonstrate the effects of current chopping and multiple reignition of the VCB.

See Figure 3, the test circuit refers to Dr Popov’s Ph.D thesis [3] and Olof Karlen’s work [4]. In the single phase circuit, the source (50Hz, 3.45kV rms) is connected by a VCB with a 0.005H reactor and a 0.1uf capacitor representing the source side, cable and busbars. 2Ω and 0.04mh represent the cable connection to the load. 0.01uf is the sum of the cable and load capacitance. 120mh is the load inductance. 100Ω, 50nh and 0.1nf represent the parasitic parameters of the gap.

The simulation results are shown in Figure 4. The “Part” signal is given at 0.016s, the instant of the contacts starting to part. The current is chopped at 0.01634s. Reignition occurs at 0.01645s. The multiple reignition lasts to 0.017s when the current is successfully interrupted. Note that the high frequency current component is much larger than the fundamental component at reignition instant, and the voltage escalates during the multiple reignition period.
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Figure 4 the current chopping and reignition of the VCB

References

1. IEC 60050-441(1984): “International Vocabulary Switchgear, Control Gear and Fuses”.


4. O.Karlen, “Vacuum circuit breaker model in PSCAD/EMTDC”
## DOCUMENT TRACKING

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