

Short-Circuit ANSI Comparison Case # 2

Comparison of ETAP Unbalanced Short-Circuit results against Published values

Excerpts from Validation Cases and Comparison Results (TCS-SC-105)

Highlights

- Comparison of ETAP unbalanced fault results against published results in “Faulted Power System Analysis” by Paul Anderson, 1973, page 38-40, [1].
- Comparison of total fault current (I_A or $3 \cdot I_0$).
- Comparison of phase voltages (V_A , V_B , and V_C).
- Comparison of sequence voltages (V_1 , V_2 , and V_0).

System Description

This is a four-bus radial system that consists of a generator, transformer, transmission line, load transformer and load. The fault is located at Bus C. The generator is rated as 25MVA, 10 kV and its Subtransient Reactance is 12.5%.

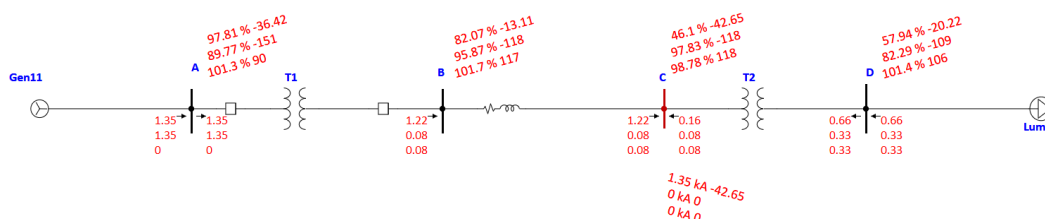


Figure 1- ETAP one line diagram

Comparison of Results

The following tables of comparison show the differences between ETAP Results and those published in Paul Anderson’s book for an unbalanced LG fault. Please note that the result differences may be caused by the fact that the Paul Anderson calculations consider the Constant Z load as a contributor to the fault. ETAP does not. The constant Z load has been replaced with an equivalent constant kVA load , also due to significant figures of simplification in the hand calculations. This document is an excerpt from TCS-SC-105 [2]

	Example	ETAP	% Diff.
I_A ($3 \cdot I_0$) (kA)	1.3	1.3	0.0
V_A	46.0	46.1	-0.2
V_B	98.1	97.8	0.3
V_C	99.1	98.8	0.3
V_1	77.4	77.5	-0.1
V_2	25.6	25.5	0.4
V_3	22.2	22.1	0.5

Table 1: Comparison of ETAP unbalanced fault results against textbook example

References

1. “Faulted Power System Analysis” by Paul Anderson, 1973, pages 38-40.
2. ETAP Short Circuit ANSI V&V Documents, Case Number TCS-SC-105.