**EE504P – S03 Assignment #8**

**Assigned:** **Session 25**

**Due:** **Session 28**

Write a program to determine the fault type and location for the text based data file Assign8.txt using the principles of phase and ground distance relaying presented in the past three lectures.

1. Present graphs showing Va and $|Va_{RMS}|$, $|V_0|$, $|V_1|$, and $|V_2|$.
2. Present graphs showing Ia and $|Ia_{RMS}|$, $|I_0|$, $|I_1|$, and $|I_2|$.
3. Present graphs showing the operations of the 3 ground distance elements using secondary quantities.
4. Assuming the pre-fault current represents the system full load current; determine the system maximum ***power*** and the magnitude of the system unbalance induced zero and negative sequence current (pre-fault |I0| and |I2|).
5. Determine the maximum power transfer during the fault.
6. Present graphs showing the operations of the 3 phase distance elements using secondary quantities.
7. Complete this table and, from it, draw your conclusions as to most likely fault type and location in %:

| Element | Minimum distance - % |
|---|---|
| A – Ground | |
| B – Ground | |
| C – Ground | |
| A – B | |
| B – C | |
| C – A | |

**Data Set:** The sampling rate is 960 Hz. Unlike the previous data sets, the data in the Assign8.txt file is arranged in the following order:

| Column | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Parameter | Time | Ia | Ib | Ic | Va | Vb | Vc |

**System information:**
The double circuit line shown in Figure 1 is strongly coupled. That is to say, the two lines share the same towers. The system operates at 230KV and uses 120/230,000 for PT and 5/1200 for CT rations. The per circuit primary-side line impedance matrix is provided by (1).

$$ZLine := \begin{pmatrix} 4.3282 + 23.201i & 2.86026 + 10.9354i & 2.78268 + 9.45733i \\ 2.86026 + 10.9354i & 4.13401 + 23.2953i & 2.69731 + 10.0147i \\ 2.78268 + 9.45733i & 2.69731 + 10.0147i & 3.99848 + 23.3608i \end{pmatrix} \quad (1)$$

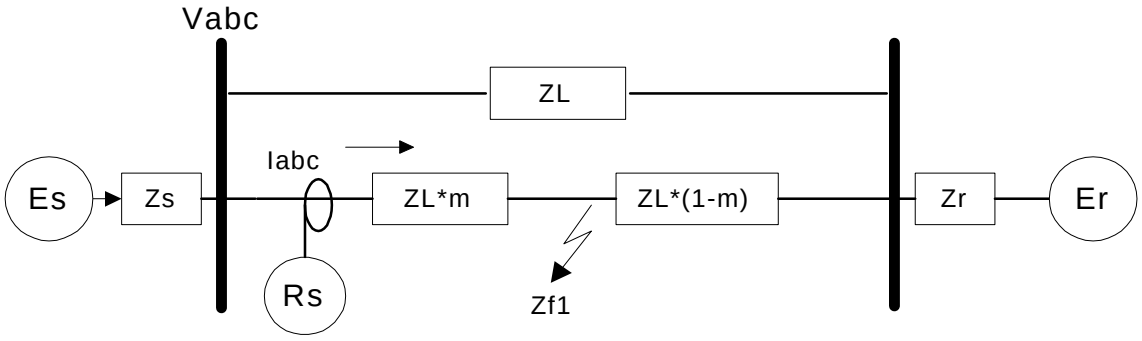


**Figure 1. System single line diagram for Assignment 8.**