EGU General Assembly 2021

GEOMAGNETICALLY INDUCED CURRENTS IN POWER SYSTEMS

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Shield Wires effect on GICs in power network and design of an instrument to monitor GICs

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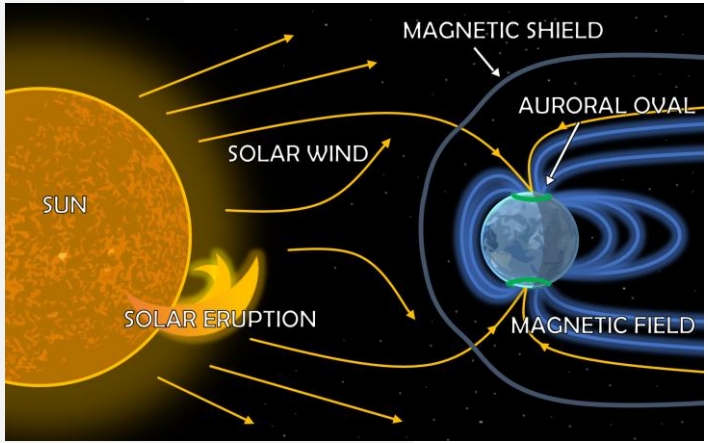
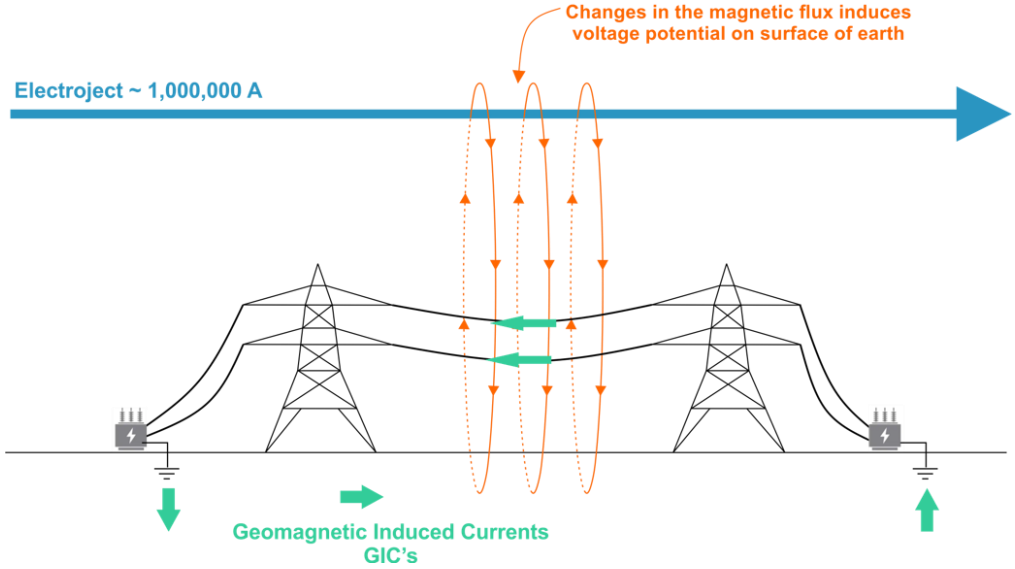
Geomagnetically Induced Currents in Power Systems





The importance of GICs mitigation

Numerous records of damage and wear of electrical network components

Half-cycle saturation of power transformers

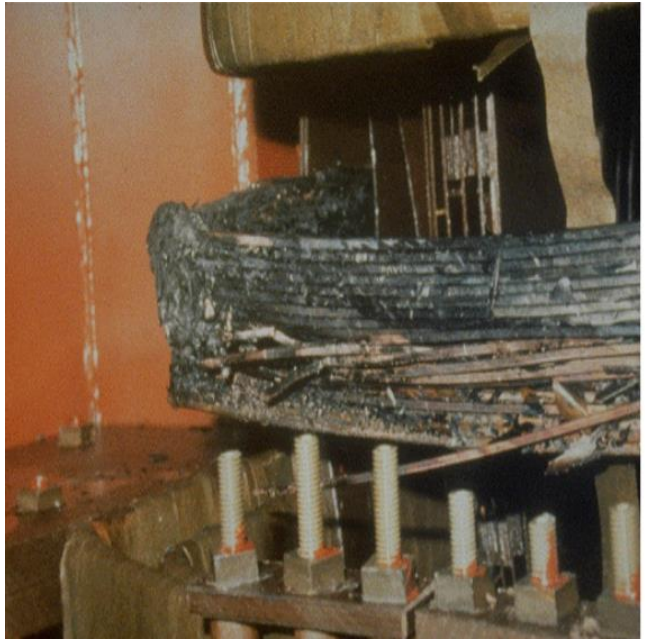
(One of the main problems in power systems)

GIC Modelling

to understand damage to Power Systems

GIC Measuring

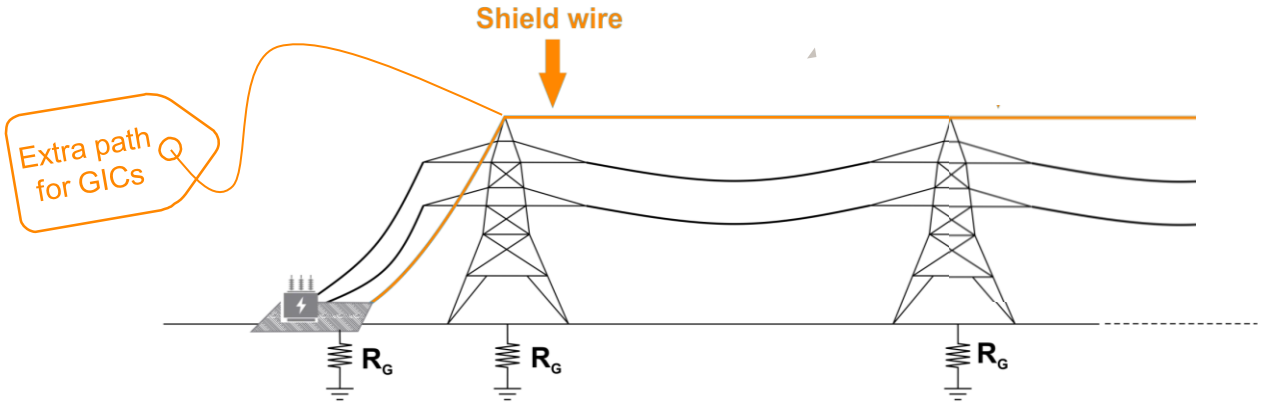
to validate the models



From Marusek, 2007

1.
GIC Modelling

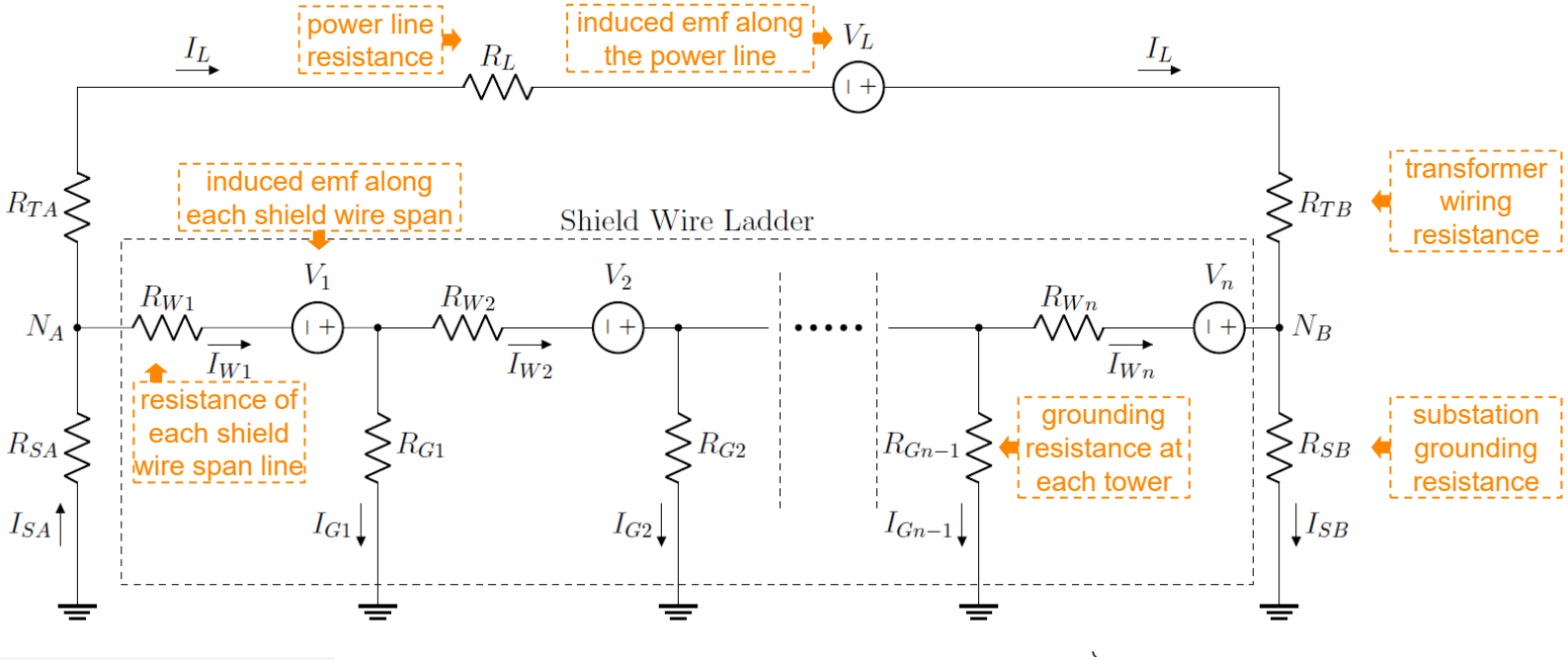
The effect of the Shield Wires



Shield Wires

Protect the power transmission line from the effect of lightning

Model for analysing the effect of shield wire on GIC

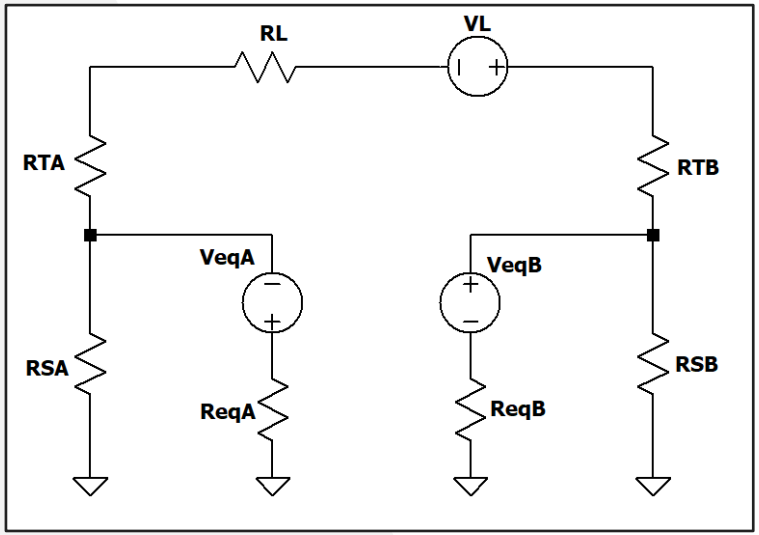


In Portuguese Network

- In Portuguese Power Transmission Network, **first initial tests** on single lines gave **errors of 5% for a short line**, if shield wires were not considered.

- It is important to **study this effect** and understand if it is necessary to include shield wires in the GIC calculation models

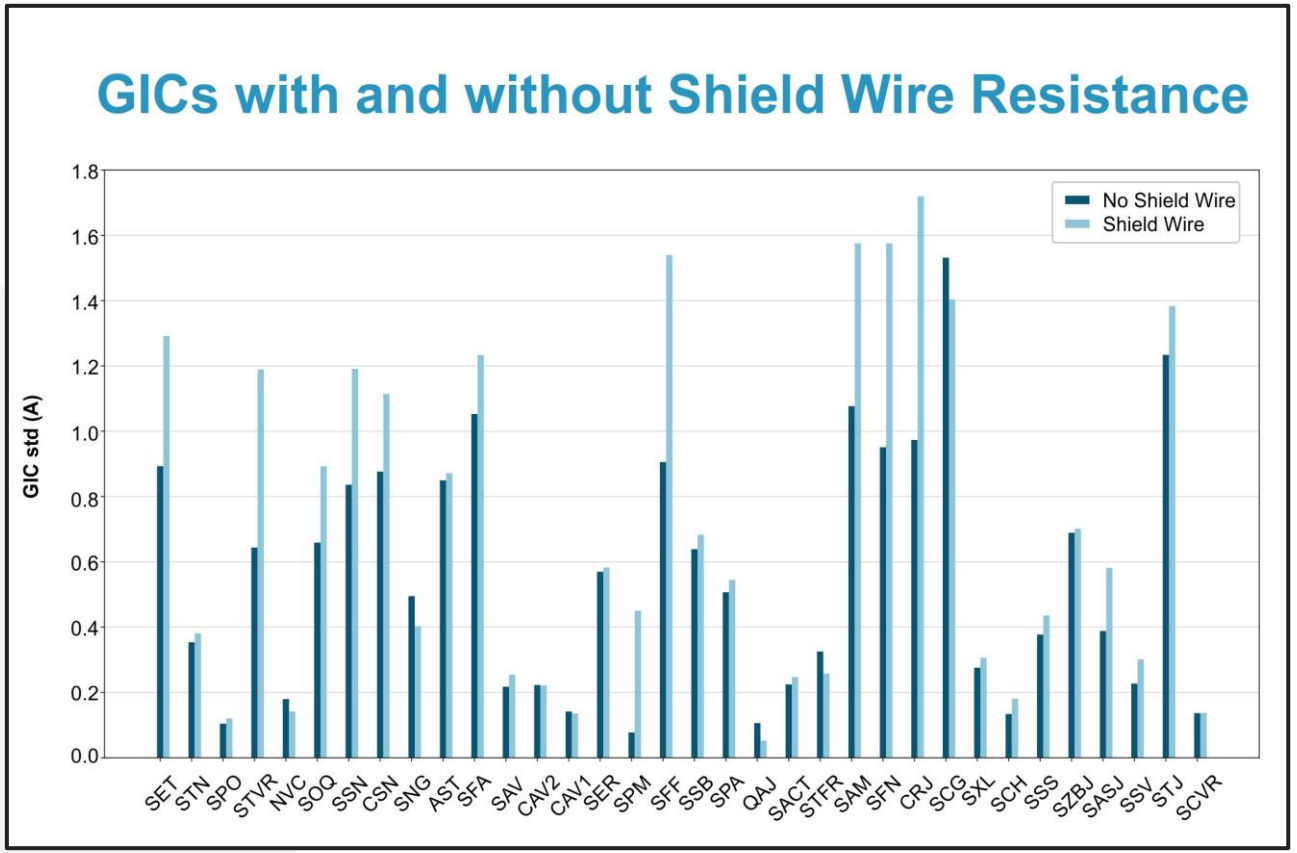
How can we simplify this study?



Getting a simpler circuit!

In which it would be sufficient to deal with a Thévenin equivalent circuit connected to each substation, as shown on the left

Results in a simulation where the induced electric field along shield wires has been neglected

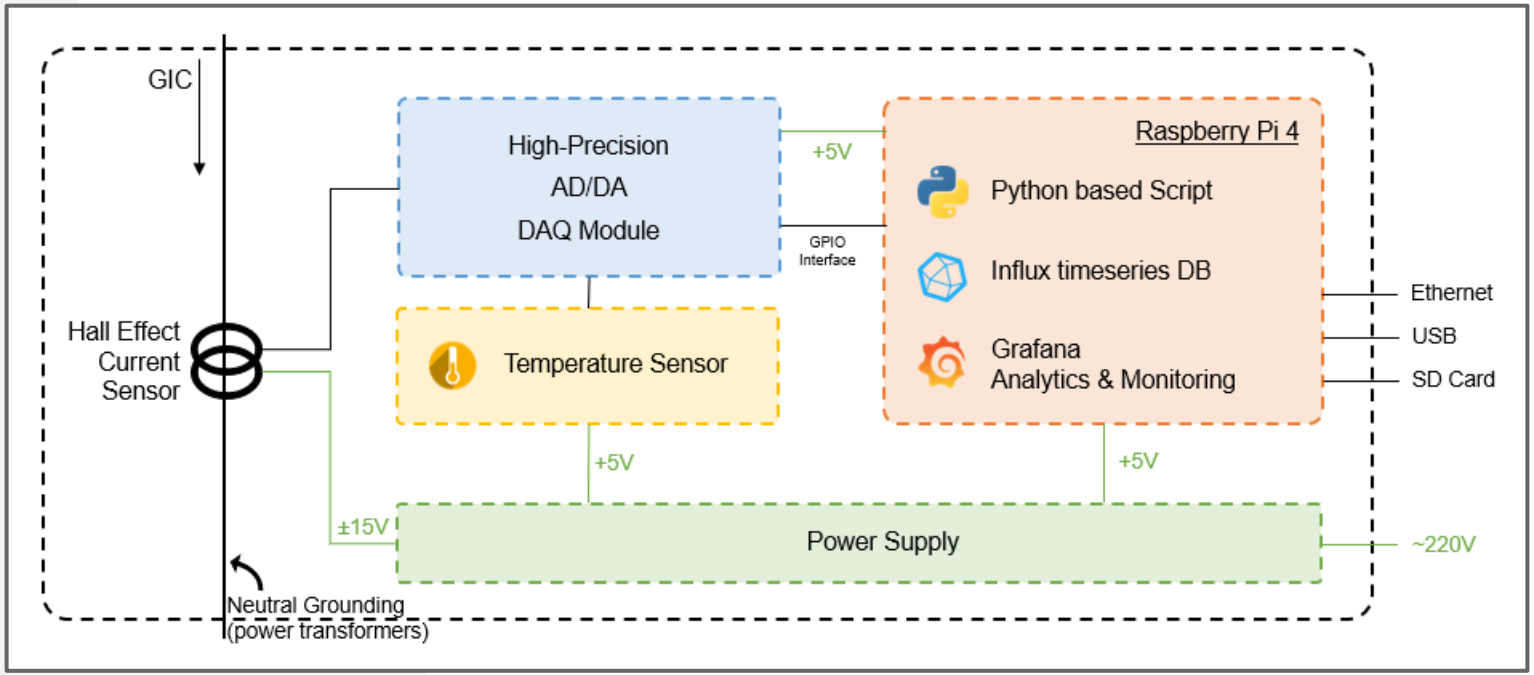


Credits to Joana Alves Ribeiro

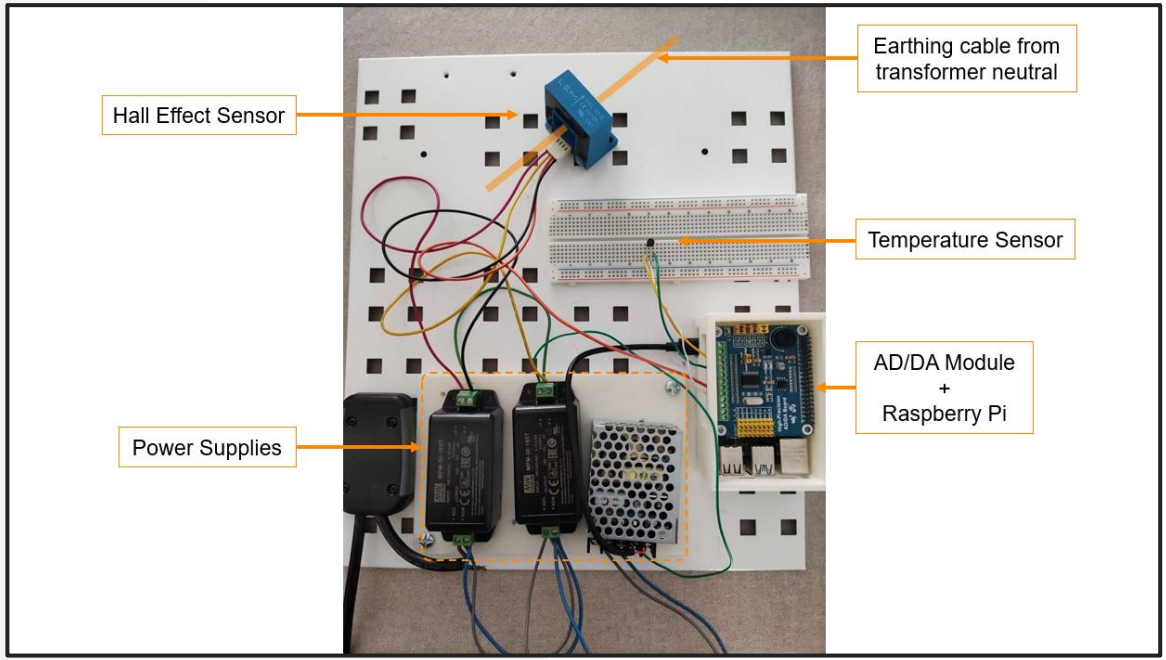
2.
GIC Measuring

The design of an equipment to monitor GICs

GIC Acquisition System



Instrument to monitor GICs



The first prototype will be installed to measure the **neutral point current** on a transformer, at a substation belonging to the national transmission system operator (REN)

Grafana Dashboard

It will be possible to obtain the data in real time and a wi-fi interface allows rapid long term trend visualization through a customized dashboard - Grafana.

THANKS!

Any questions?

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