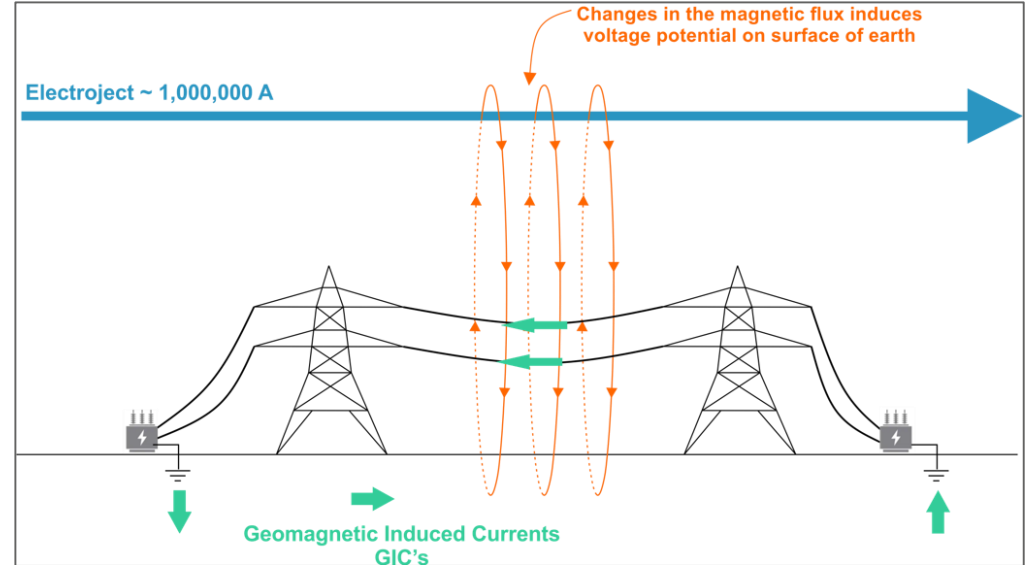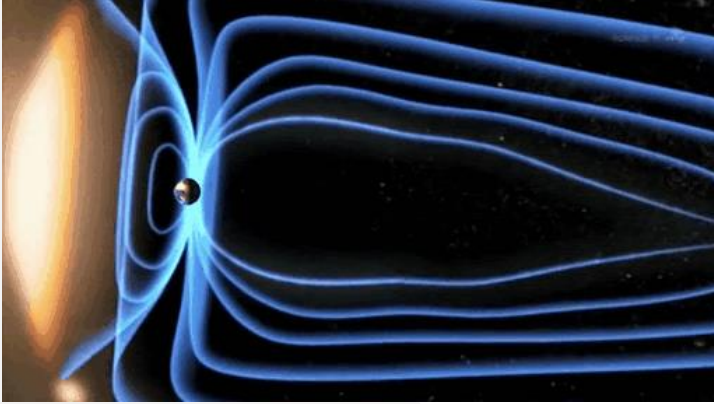# GEOMAGNETICALLY INDUCED CURRENTS IN POWER SYSTEMS

Rute Rodrigues Santos, M. Alexandra Pais, João Cardoso, Miguel Silva, Joana Alves Ribeiro, Fernando Pinheiro
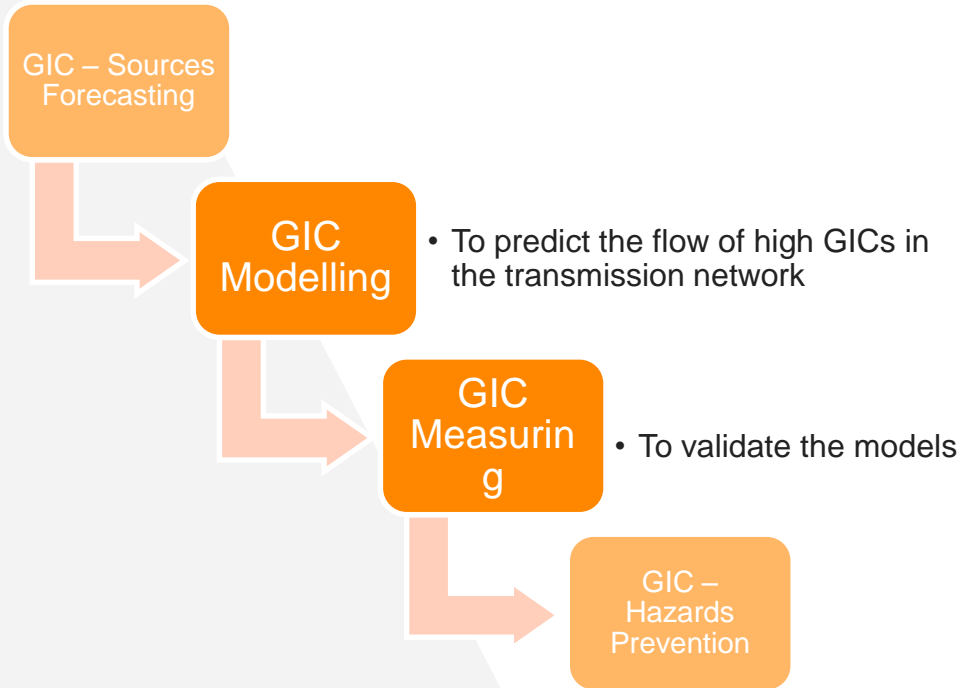
Shield Wires effect on GICs in power network and design of an instrument to monitor GICs

Geomagnetically Induced Currents in Power Systems

Credits to Joana Alves Ribeiro

The importance of GICs mitigation

GIC – Sources Forecasting

GIC Modelling

- To predict the flow of high GICs in the transmission network

GIC Measuring

- To validate the models

GIC – Hazards Prevention

Numerous records of voltage sag, premature ageing of transformers and in some cases regional outages.
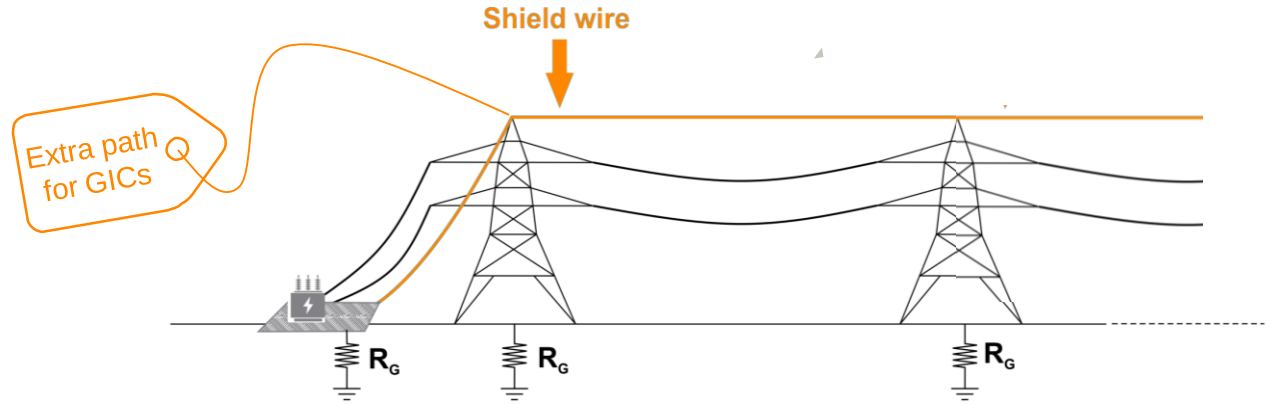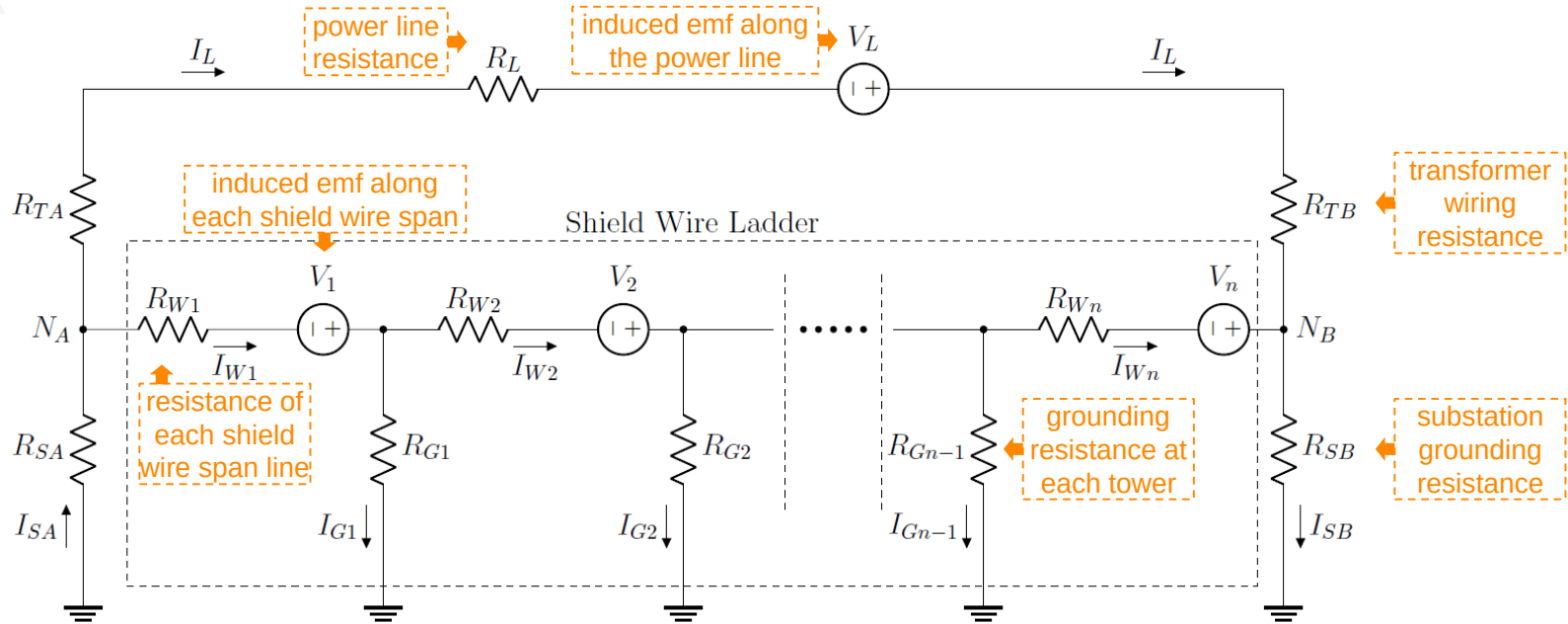

From Marusek, 2007

1.

GIC Modelling

The effect of the Shield Wires

Shield Wires

Protect the power transmission line
from the effect of lightning
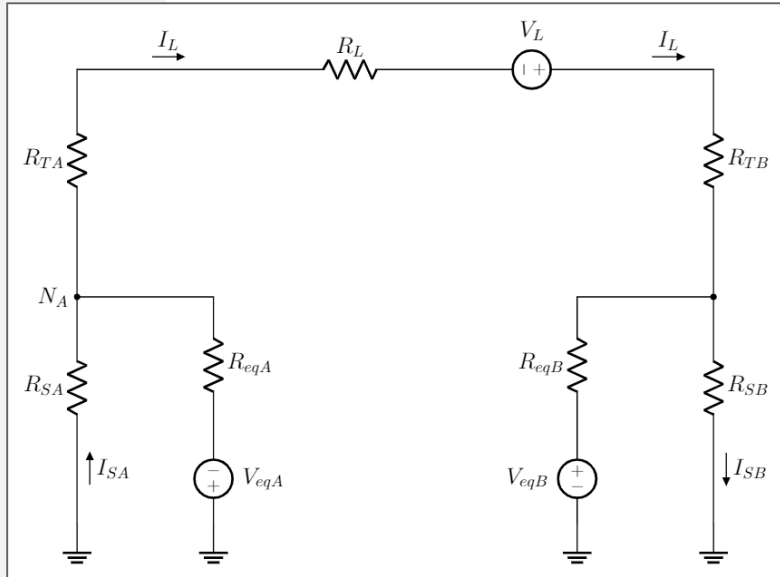
Model for analysing the effect of shield wire on GIC

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.

▸ When combining different lines, the effect may increase.

▸ It is important to **study this effect** and understand if it is necessary to include shield wires in the GIC calculation models
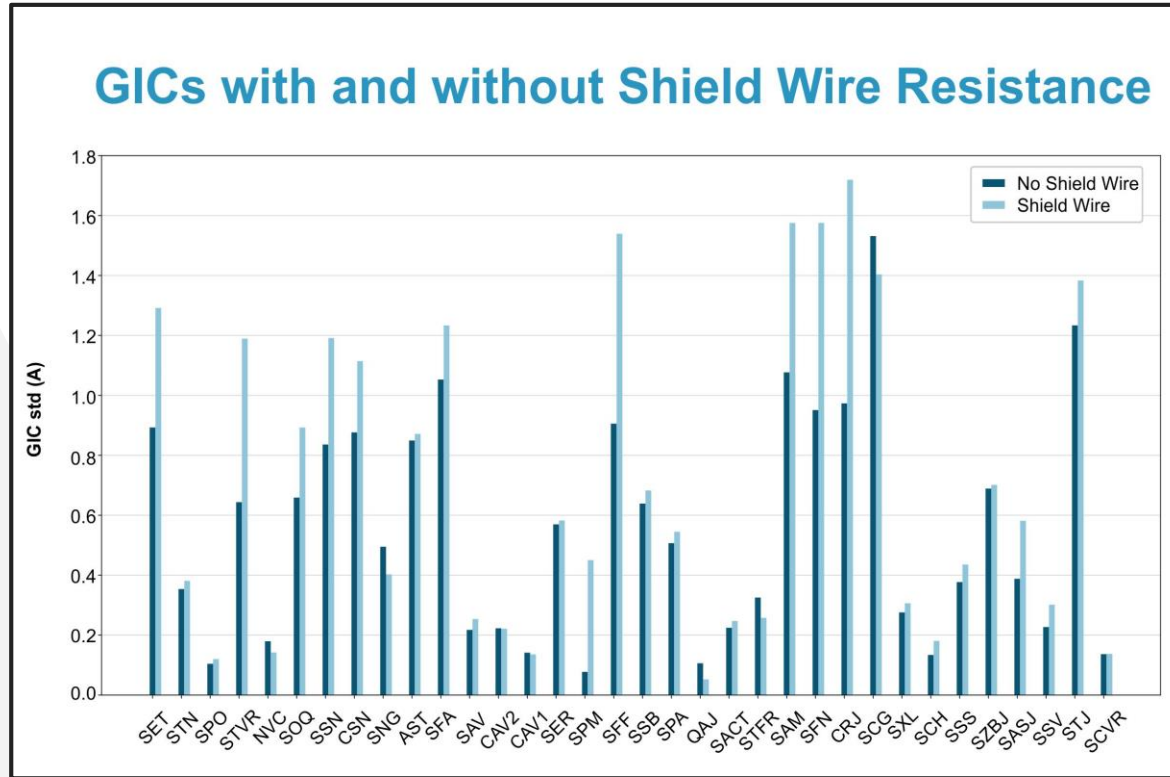
How can we simplify this study?

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 from a simulation in a complex power network.
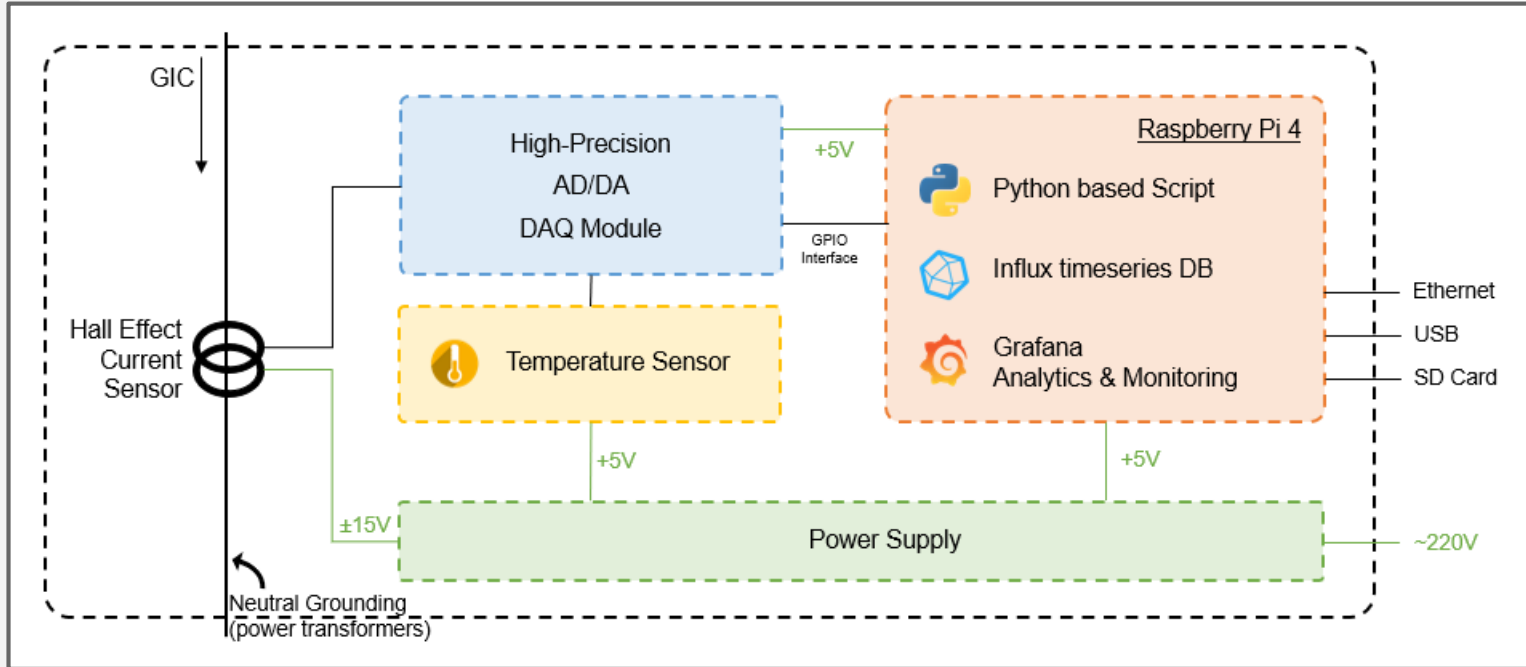Only the effect of the resistance of shield wires has been considered.
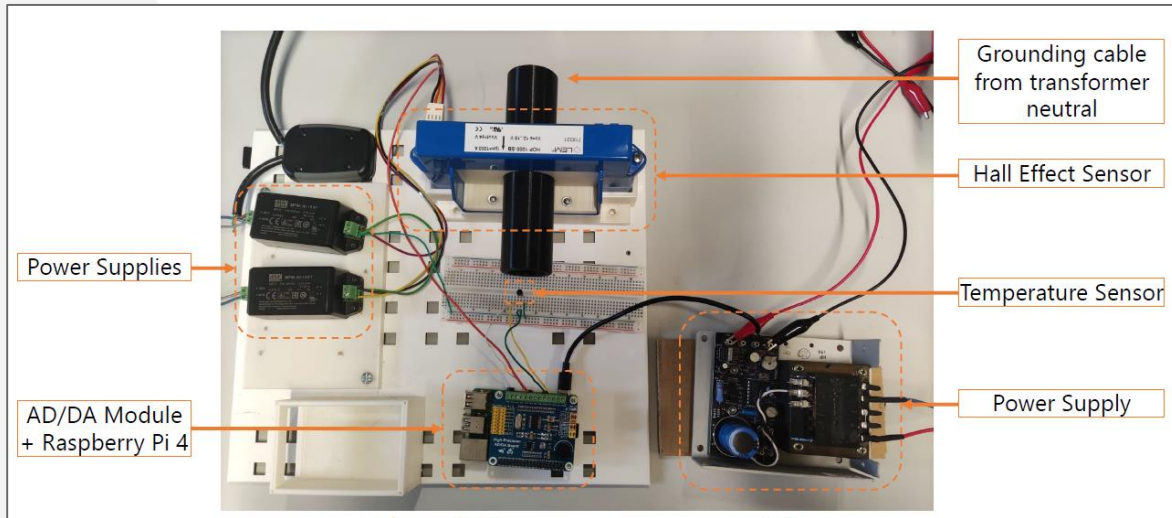

Credits to Joana Alves Ribeiro

2.

GIC Measuring
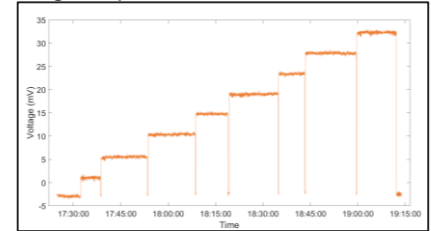
The design of an equipment to monitor GICs

GIC Acquisition System

Instrument to monitor GICs
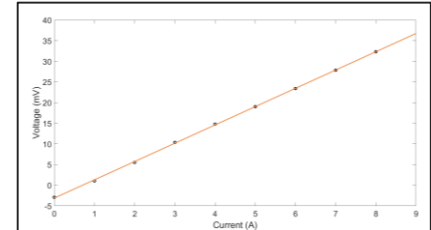

The first prototype will be installed to measure the **neutral point current** on a transformer, at a substation belonging to the national transmission system operator (REN)

Substation Paraimo

Thank you. Any questions? You can contact me: **rute2rodrigues@gmail.com**