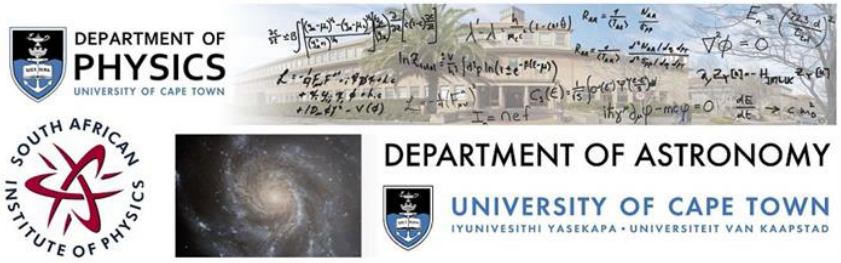

Contribution ID: **265** Type: **Poster Presentation**

Surface Impedance Derived from the South African Magnetotelluric Network for the estimation of geomagnetically induced currents in the South African Power network

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
Formatting &
Special chars

Geomagnetically Induced Currents (GIC) in power lines are driven by the geo-electric field that is induced between grounded points of the network by a varying geomagnetic field. The electric field is derived by the multiplication of the horizontal components of the geomagnetic field with the local surface impedance in the frequency domain. Tensor surface impedance values can be derived from the simultaneous measurement of the variations in the induced geo-electric field and the geomagnetic field by means of magneto-telluric (MT) devices. Alternatively the surface impedance can be calculated from Earth conductivity profiles based on MT surveys.

This paper presents the first analysis of the surface impedances derived from the South African network of eight LEMI417 MT units deployed since April 2012 by SANSA Space Science as part of the South African Ionospheric, Geophysics and Geomagnetic Experimental Resource (SNIGGER) funded by the NRF's National Equipment Programme. The geographic variation of the surface impedance is presented and compared with surface impedances derived from 1D planar multilayer approximations of the ground conductivity profiles obtained by means of the Southern African Magneto-telluric Experiment (SAMTEX), conducted over parts of South Africa during the period 2003 to 2008. A comparison is made between the use of the complex spectral coefficients of the tensor surface impedance and the surface impedance derived from the homogeneous and isotropic Earth approximation in the calculation of GICs at selected locations in the South African power network, which has been used in several studies on GICs in the Southern African network.

The results of this study demonstrate the importance of using in-situ measured values of the surface impedance for accurate estimation of GICs.

Apply to be
 considered for a student
   award (Yes / No)?

No

Level for award
 (Hons, MSc,
   PhD, N/A)?

N/A

Main supervisor (name and email)
and his / her institution

N/A

Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

Yes

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Dr CILLIERS, Pierre (SANSA Space Science)

Co-author: Mrs MATANDIROTYA, Electdom (SANSA Space Science & CPUT)

Presenter: Dr CILLIERS, Pierre (SANSA Space Science)

Session Classification: Poster Session (2)

Track Classification: Track D2 - Space Science