

## Multi-frequency calibration of grounded electric lines

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### SUMMARY

The electric field sensor (grounded dipole) sensitivity is usually assumed to be numerically equal to the electric dipole length, and hence, as not requiring any calibration. However, this assumption is valid only if the electrode contact resistance (ECR) values are relatively small. In many practical cases (e.g., when working on sandy, stony or frozen soil) the ECR values could easily reach dozens of kilohms, which may cause a dramatic decrease of the system sensitivity to the electric field at higher frequencies, known as the ECR effect or ECR distortion ([Zonge and Hughes, 1985](#)).

In this paper we consider the first field tests of the recently proposed technique of multi-frequency in-situ calibration of grounded electric lines ([Zorin and Epishkin, 2022](#)). The obtained results show that this technique could effectively suppress the ECR distortion of MT and AMT data up to the frequencies of 20 kHz.

We also demonstrate that accurate fitting of the measured complex impedances of poorly grounded lines with a simple RC-circuit model of [Zonge and Hughes \(1985\)](#) is impossible. Instead, for this purpose one should use the generalized Cole-Cole model of [Zorin and Bobachev \(2022\)](#) with complex electrode resistances.

**Keywords:** poor electrode contact, ECR effect, electric field measurement.

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