

# *New technology for the current measurement in disturbed environment*

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The Planar Rogowski current (i) MEasurement (PRiME) technology is a novel method in the field of measuring AC currents developed by LEM company. PRiME is an air-cored technology based on planar magnetic sensors, constructed without using ferromagnetic material, robust to external disturbances and an original design allowing the manufacturing process.

In this study, we developed a software tool for the analysis, design and simulation of the PRiME sensors. The general Neumann's formula was used to compute the response of a PRiME system. This approach allows:

- the geometrical configuration of the coils can be treated in more precise way
- the length and shape of the exciting conductors can be taken into account in a straightforward way
- manufacturing defaults such as angle or radial deviation can be accounted for.

The mutual inductance theory of wires in the space is first introduced and implemented to some particular cases. The theory is applied to PRiME and is then validated with *Flux 3D* for some practical cases. The simulations are also compared with experimental results.

A sensitivity analysis of the head is carried out considering some key parameters such as the thickness of the coils, the influence of the external wires to the head, the influence of the orientation of the conductor. Two basic manufacturing defaults are also analyzed. The case of bus bar conductors is also considered and included in the simulations using the concept of geometrical mean distance (GMD) and mean radius (GMR).

A general presentation of the three versions of the PRiME software tool are described.