

# ECT measurement in bio-application

Daniela Gombarska\*

\*Faculty of Electrical Engineering, University of Zilina, Univerzitna 1, Zilina, Slovakia, e-mail: Daniela.gombarska@fel.uniza.sk

**Abstract** An influence of tissues in living organism to the signal of ECT is studied. Continual changes in volume and instant composition of a structure in vicinity of a coil cause changes in measured ECT signal.

**Keywords** ECT, impedance, tissue.

## I. INTRODUCTION

A contactless and non-destructive examination of structures' integrity or sustainable functionality of systems becomes of high importance for many departments of industry and common life as well. There is wide range of methods developed for such kind of inspection, sometimes very specific to its purpose. The contribution of these methods is undisputable. No one would like to fly with a plane without regular inspection of all systems and integrity of all structures. Even in case of own health one would prefer as gentle methods as possible.

Methods of non-destructive evaluation of conductive materials are also wide and well developed. One of them, an Eddy Current Testing (ECT) method is well developed method with many advantages such as:

- non-contact measurement,
- high sensitivity,
- simple installation,
- simple operation,
- easy post-processing of measured results, etc.

The ECT methods use the principle of electromagnetic field as the basis for materials inspection. The principle of this method uses electromagnetic induction phenomena, where a coil excited with alternating current creates a primary magnetic field in its vicinity. When the coil is placed near an electrically conductive material, the alternating magnetic field penetrates the material and generates continuous, circular eddy currents. [1], [2]

The ECT method has its undeniable advantages, but when used for examination of implants, an invasive procedure must be made to approach a surface of examined object. The structure of living organism is highly inhomogeneous containing tissues with different physical properties which changes continually as a life-processes, e.g. blood distribution, take a place. In general, tissues could be considered as a finite, inhomogeneous volume conductor, which is represented by three element model with two resistors and capacitor.

## II. REFERENCES

- [1] Strapacova, T., Smetana, M., Capova, K.: "Non-destructive investigation of the artificial heart valves using eddy current testing - An innovative approach" (2012) Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 7339 LNBI, pp. 331-340..
- [2] Strapacova, T., Capova, K., Smetana, M.: "Biomaterials inhomogeneities detection by electromagnetic methods" (2011) *Komunikacie*, 13 (1), pp. 32-36..