

Rafał CZARNY <sup>1</sup>, Henryk MARCAK <sup>2</sup>, Sylwia TOMECKA-SUCHOŃ <sup>3</sup>

<sup>1</sup> Division of Geodyn. & Environ. Eng. MEERI of Polish Academy of Sciences ul. Wybickiego 7, 31-261 Krakow, Poland; <sup>2</sup> Institute of Geophysics Polish Academy of Sciences ul. Księcia Janusza 64, 01-452 Warszawa, Poland; <sup>3</sup> The AGH University of Science and Technology, Department of Geophysics Faculty of Geology, Geophysics and Environmental Protection 30-059 Krakow, Al. Mickiewicza 30, Poland

## **Estimation of soil water content by assess dielectric losses of ground-penetrating radar waves**

### **Abstract**

Estimation of soil water content by assess dielectric losses of ground-penetrating radar waves has been presented. The soil moisture distribution within shallow soil zones is the most important parameter in assessment agricultural conditions for a plant cultivations. The easy and reliable method is searched for quick asses the changes of soil moisture contribution in the soil is one with essential problems in the state-of-art agriculture technology. The ground-penetrating radar can be used for estimation soil water content. The most popular attitude is based on the measurement of radar wave velocity. In our attitude, it is shown that the increase of the soil water content cause changes of the quality factor related to dielectric losses of ground-penetrating radar waves and in result also changes the shape and amplitude of the radar signals. Results obtained in an experiment in which water was poured into soil and radar signals were measured in a controlled time intervals-are explained by dielectric losses theory.