Geophysical Research Abstracts
Vol. 17, EGU2015-14901, 2015
EGU General Assembly 2015

The influence of Stochastic perturbation of Geotechnical media On Electromagnetic tomography

Lei Song, Weihao Yang, Jiahui Huangsonglei, and HaiPeng Li

State Key Laboratory for Geomechanics & Deep Underground Engineering, School of Mechanics & Civil Engineering, China University of Mining and Technology, Xuzhou, 221008, China (songlei@cumt.edu.cn)

Electromagnetic tomography (CT) are commonly utilized in Civil engineering to detect the structure defects or geological anomalies. CT are generally recognized as a high precision geophysical method and the accuracy of CT are expected to be several centimeters and even to be several millimeters. Then, high frequency antenna with short wavelength are utilized commonly in Civil Engineering. As to the geotechnical media, stochastic perturbation of the EM parameters are inevitably exist in geological scales, in structure scales and in local scales, et al. In those cases, the geometric dimensionings of the target body, the EM wavelength and the accuracy expected might be of the same order. When the high frequency EM wave propagated in the stochastic geotechnical media, the GPR signal would be reflected not only from the target bodies but also from the stochastic perturbation of the background media. To detect the karst caves in dissolution fracture rock, one need to assess the influence of the stochastic distributed dissolution holes and fractures; to detect the void in a concrete structure, one should master the influence of the stochastic distributed stones, et al. In this paper, on the base of stochastic media discrete realizations, the authors try to evaluate quantificationally the influence of the stochastic perturbation of Geotechnical media by Radon/Iradon Transfer through full-combined Monte Carlo numerical simulation. It is found the stochastic noise is related with transfer angle, perturbing strength, angle interval, autocorrelation length, et al. And the quantitative formula of the accuracy of the electromagnetic tomography is also established, which could help on the precision estimation of GPR tomography in stochastic perturbation Geotechnical media.

Key words: Stochastic Geotechnical Media; Electromagnetic Tomography; Radon/Iradon Transfer.