A model of electro-elasticity for detection of deep underground anomalies

K. A. Chishko

B.Verkin Institute for Low Temperature Physics and Engineering, 47 Lenin Avenue, Kharkov 61103, Ukraine (chishko@ilt.kharkov.ua/Fax: +38(057)345-05-93; +38(057)340-33-70)

The model of electro-elastic coupling is proposed and the system of equations has been introduced to describe the spatial distribution of conjugated elastic and electromagnetic fields generated by sources of internal stresses in an isotropic piezo-elastic medium. The Green function for isotropic piezo-elastic half-space has been built and the expression describing the space distribution of the elastic fields in the half-space and electromagnetic fields within the whole space generated by a system of spatially distributed dynamical sources of internal stresses have been obtained. It is shown that the electromagnetic field distribution on the surface of the media contains the sufficient information to localize an underground internal stress source using a corresponding algorithm which based on the treatment of an underground source as an effective set of point radiators with certain time-dependent dipole moments. Applications of the results for detection of natural static and dynamic anomalies in piezo-elastic rocks(granites)have been discussed.