Determining the depth of inclusion in the underlying environment

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Determination of the depth of the inclusion in the underlying medium
The work is devoted to the problem of determining the depth of the inclusion in the underlying medium. The algorithm for determining the depth of occurrence is based on the method of sounding with the use of GPR equipment of the Loza-V series. There are two methods of georadar survey: "profiling"and "probing". During profiling, the radar moves along the track along with the transmitting and receiving antennas. When probing, one point of the route is selected, then a series of registrations of reflected signals is carried out when the antennas of the source and receiver are spaced at equal distances in different directions. As a result of these measurements, a hodograph is obtained – a function of the delay time of the reflected signals [1]. According to two measurements of signal delays and and the known distances between the receiver and the source and , the depth of the inclusion is determined from the following ratio [1]:

Then, based on the known power of the first layer, we can determine the dielectric permittivity of the host medium:

A software module for determining the depth of the inclusion in the underlying medium has been compiled and its important characteristic, the dielectric constant, has been identified.
The design of the applied GPR "Loza-V"allowed the source and the receiver antenna to be separated, which allowed the hodograph to be determined by the delay times and spacing distance and thereby calculate the desired parameters. Thus, the probing method is the most informative for the type of tasks under consideration. To test the software module, a number of targets were prepared in the field, immersed in a host medium (pure sand), namely: an iron canister; plastic bottles: peat briquette. The results of experimental studies using the GPR series "Loza-V the method of sounding gave a positive result.
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Literature

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