

地中レーダへの位相アレイ型アンテナ適用性の研究 Applicability of Phased Array Antenna to Ground Penetrating Radar

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Ground Penetrating Radar (GPR) has been widely used to detect objects in shallow subsurface. A bow-tie antenna, which is one of the major antennas, provides the clear cross sections in the shallow subsurface, especially under the survey line. On the other hand, the resolution across the survey lines depends on its interval. To overcome this problem, we tried to apply a phased array system to GPR. We conducted numerical simulations using a three-dimensional model composed of water, dry sand and some small perfect conductors with cubic shape. We compared two different kinds of antenna, a dipole antenna and a phased array antenna. The phased array antenna has an 8 x 8 sending unit and one receiving unit at the center of the radar. Both antennas have the length of about 0.5 meters. Our results show that the phased array antenna enhanced the noise-to-signal ratio and it also enhanced the amplitude of a scattered wave from a perfect conductor located out of the survey line. We conclude that the application of the phased array system to GPR has a potential to survey with wider angle than the conventional GPR system.