

# A study of geoelectric potential using the leak current from railroad as a signal

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Geoelectrical studies in city and neighborhood frequently suffer from high artificial noises. In particular, rail leak currents produced by the rail-to-ground voltages of DC train have a wide area of influence because the voltage and current used in train operation are extremely high, and the periods range from several seconds to tens seconds. The investigation of resistivity structure which positively used the leak current is reported by Doi and Sumitomo (1984), Miyakoshi (1984), etc. Moreover, Tanbo et al. (2002) verified the availability as a monitoring system of seismic activity by long-term observation of apparent resistivity.

In this study, we thought that the geoelectric potential difference change by leakage current reflected the resistivity of the earth, calculated average value for the day, and estimated the long-term analysis result. Unless the diagram of each domestic passenger railways is very exact and the disorder of a diagram and the change in the large amount of passengers by an accident happen, it seems that the power supply from a substation is in general constant. Moreover, if change of the rail resistance by rainy weather, and change of the rail ground resistance by temperature, solar radiation, etc. and above factors is discriminable, resistivity change of the earth will consider that change of other earth potential differences can presume a cause.

We analyzed using three data, the Atsugi and Hiratsuka observation point of Kanagawa Prefecture, and the Ito observation point of Shizuoka Prefecture. As for the earth potential difference of each observation point, change by which the rail leak current from Odakyu Electric Railway Odawara Line, JR Tokaido Line, and the Izukyu Shimoda line is considered to be the cause appears clearly. A long-term change approximated very much appears in the analysis result in all observation points, and although the weather element is not separable for the moment, I think that a certain broad-based natural phenomenon is reflected.