عنوان مقاله:

Improving the results of singular value decomposition inversion using direct transformation of frequency-domain HEM data

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نویسندگان:

A. Asadian - *دانشجوی کارشناسی ارشد ژئوفیزیک، دانشکده مهندسی مهندسی معدن، نفت و ژئوفیزیک، دانشگاه شاهرود، ایران*

A. Moradzadeh - *استاد، دانشکده معدن، پردیس دانشکده های فنی، دانشگاه تهران،*

A. R. Arabamiri - *استادیار، دانشکده مهندسی مهندسی معدن، نفت و ژئوفیزیک، دانشگاه شاهرود، ایران*

A. Nejati - *استادیار، دانشکده مهندسی مهندسی معدن، نفت و ژئوفیزیک، دانشگاه شاهرود، ایران*

D. Rajabi - *دانش آموخته کارشناسی ارشد ژئوفیزیک، دانشکده مهندسی مهندسی معدن، نفت و ژئوفیزیک، دانشگاه شاهرود، ایران*

خلاصه مقاله:

Helicopter-borne electromagnetic (HEM) is a fast and high resolution airborne electromagnetic (AEM) method that is frequently used for imaging of the subsurface resistivity structures. This is a versatile and cost effective method, frequently has used in mineral and groundwater exploration and various environmental problems. Modern frequency-domain HEM systems utilize small electromagnetic, magnetic, Global Positioning System (GPS) and laser altimeter sensors which are encapsulated in a “bird”, a cigar-shaped ۹ m long tube, which is kept at about ۳۰–۴۰ m above the ground level. Separation between the rigidly mounted transmitter and receiver coils typically lies between ۴ and ۸ m. The modern HEM systems use a multi-frequency devices operating at ۴–۶ frequencies, ranging from ۲۰۰ Hz to ۲۰۰ kHz. In this method, a sinusoidal current flow through the transmitter coil generates a primary magnetic field at a frequency that is very close to a dipole field at some distance from the transmitter coil. The primary oscillating magnetic field induces eddy currents in the subsurface of the Earth. These currents, in turn, generate a secondary magnetic field, which is related to the Earth resistivity distribution. The receiver coils measure the induced secondary magnetic field with respect to the primary magnetic in parts per million (ppm). Due to the induction process of the Electromagnetic (EM) field, there is a small phase shift between the primary and secondary fields. In practice, the transmitter coil is horizontal (VMD: vertical magnetic dipole) or vertical (HMD: horizontal magnetic dipole) and the receiver coil is oriented in a maximally coupled position, resulting in horizontal coplanar (HCP), vertical coplanar (VCP), or vertical coaxial (VCA) coil systems. The final results of the frequency domain HEM data are normally presented in the form of resistivity maps in various frequency or depth levels or as resistivity depth sections along the survey lines for interpretation. The vertical resistivity sections are constructed by concatenating the resistivity models for every measuring point along a survey line. Several methods have been developed to prepare these resistivity maps or depth sections. Many techniques have been developed to model the measured HEM data during the recent ۳۵ years. They are classified into two general groups: (۱) direct transform of the data into a generalized model such as a half-space, and (۲) inversion of the data to a specific model such as a layered Earth, for which a starting model is ... used, followed by iterative fitting of the data in

کلمات کلیدی:
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