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Application of Finite Element method for interpretation of gravity data

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Gravity data helps in predicting density variations which can be related to sources of geological interest at depth. An important part of field gravity data processing is the reduction of the observed gravity data by making corrections for various extraneous disturbances before attempting any interpretation. An important component of this process is the separation of gravity anomalies in to the **Regional** and **Residual** components. When the survey is for mineral investigations, it is observed that more often than not, the regional component is left unattended by the interpreter. This happens in spite of the fact that this component contains immense information about the deep seated variations in density. Hence, these regional gravity variation maps can help us in understanding the continental crust. It is also observed that these maps carry detail signatures structural variations which can help us, in association with other geophysical data, in understanding the tectonic patterns at depth. The latest technique of Finite Element Analysis (FEA) for the separation of regional and the residual of the gravity data have been explained in detail in the paper. Some case studies have been discussed wherein the gravity regional maps prepared by the FEA technique have been analyzed for inferring deep seated structures. These have been corroborated with the other geological and geophysical information for establishing the use of this technique in gravity data analysis for deep seated bodies. An attempt has also been made to compare the regional maps obtained by using different methodologies for separation of regional and residual anomaly maps over various geological settings. It is clearly brought out that the maps prepared using FEA show more resolving power and are more accurate. In addition to this, the FEA technique is easy to learn and adapt for separation of regional and residual. The paper gives the application of this technique for analyzing the gravity data.

Key words: Gravity data, Processing and interpretation, separation of regional and residual, finite element analysis