Postupak za 2D linearnu inverziju gravimetrijskih podataka - testiranje i primena

Ivana Vasiljević, Branislav Sretković, Ivan Dulić, Vladislav Gajić

Дигитални репозиторијум Рударско-геолошког факултета Универзитета у Београду

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POSTUPAK ZA 2D LINEARNU INVERZIJU GRAVIMETRIJSKIH PODATAKA - TESTIRANJE I PRIMENA

Ivana Vasiljević[1], Branislav Sretković[1], Ivan Dulić[2], Vladislav Gajić[2]
[1]Univerzitet u Beogradu – Rudarsko-geološki fakultet, Beograd, Srbija,
[2]NTC NIS-Naftagas, Novi Sad, Srbija
E-mail: ivana.vasiljevic@rgf.bg.ac.rs

Ključne reči: gravimetrijska inverzija, lateralna raspodela gustine

Postupak 2D linearne inverzije gravimetrijskih podataka, koji je razvijen na Departmanu za geofiziku Rudarsko-geološkog fakulteta za potrebe ispitivanja podloge neogenih basena, testiran je u uslovima izražene topografije podloge. Postupak može da se primeni samo kada su poznate vrednosti dubine do podloge. Finalni rezultat inverzije je lateralna raspodela gustine stena u podlozi basena. Ranije izvedena testiranja primene postupka na sintetičkim modelima pokazala su da potencijalni problem može da se javi ako postoje nagle promene u dubini basena. Problem je više izražen u zonama u kojima je podloga na maloj dubini. Iako uticaj izražene topografije podloge na rezultate inverzije (distribuciju gustine) može da se umanji filtriranjem, bilo je potrebno da se izvrše testovi u realnim uslovima. Istražno područje u zapadnoj Bačkoj, na kome postoje izražene promene u topografiji podloge, izabrano je kao lokacija za testiranje. Raspon dubine podloge je od oko 250 m do oko 1900 m. Gravimetrijska inverzija izvedena je duž 16 profila. Profili su ravnomerno raspoređeni na istražnom prostoru i postavljeni u dva upravna pravca (jug-sever i zapad-istok), kako bi se proverile razlike do kojih može da dođe, ukoliko se odabere jedan dominantan pravac pružanja profila. Analizirane su vrednosti razlika gustine u tačkama preseka profila u različitim fazama (iteracijama) inverzije. Izdvojene su zone sa izraženim promenama u dubini podloge i analizirane su promene u raspodeli vrednosti gustine. Na osnovu rezultata dobijenih primenom linearne inverzije duž profila, izrađene su i interpretirane karte distribucije gustine podloge na ispitivanom prostoru. Rezultati gravimetrijske inverzije su upoređeni sa dostupnim podacima o starosti i litologiji podloge basena, kao i podacima merenja gustine stena u bušotinama.

METHOD FOR 2D LINEAR INVERSION OF GRAVITY DATA - TESTING AND APPLICATION

Ivana Vasiljević[1], Branislav Sretković[1], Ivan Dulić[2], Vladislav Gajić[2]
[1]University of Belgrade – Faculty of mining and Geology, Belgrade, Serbia
[2]NTC NIS-Naftagas, Novi Sad, Srbija
E-mail: ivana.vasiljevic@rgf.bg.ac.rs

Key words: gravity inversion, lateral density distribution

Method for 2D linear inversion of gravity data, that was developed by the Department of Geophysics, Faculty of Mining and Geology for the investigation of Neogene basins basement, was tested in the case of rugged basement topography. Method can be applied only when depth-to-basement data are available. Final result of the inversion is lateral density distribution of rocks in the basin basement. Previously conducted tests of the method application on synthetic models have implicated that potential problem could occur in case of abrupt changes in the basement depth. That problem is emphasized in the areas where basement is shallow. Although the effect of rugged basement topography on inversion results (density distribution) can be downsized by filtering, it was necessary to test it using field data. Research area in the western Bačka, where abrupt variations in the basement depth exist, was chosen as a test location. Depth-to-basement data range from about 250 m to about 1900 m. Gravity inversion was conducted along 16 profiles. Profiles were evenly distributed over the investigation area and they were placed in two orthogonal directions (south-north and west-east) in order to check the differences that may occur if one dominant profile direction is chosen. Deviations in density values for the crossing points of the profiles were analyzed for different phases (iterations) of the inversion procedure. Areas of abrupt changes in the basement depth were selected and variations in density distribution were analyzed. Basement density maps of the investigation area ware compiled based upon the results of linear inversion along the profiles and then interpretated. The results of gravity inversion were compared to all available data on age and lithology of the basin basement, as well as to density data measured in the boreholes.