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(54) Title: JOINT INVERSION WITH UNKNOWN LITHOLOGY

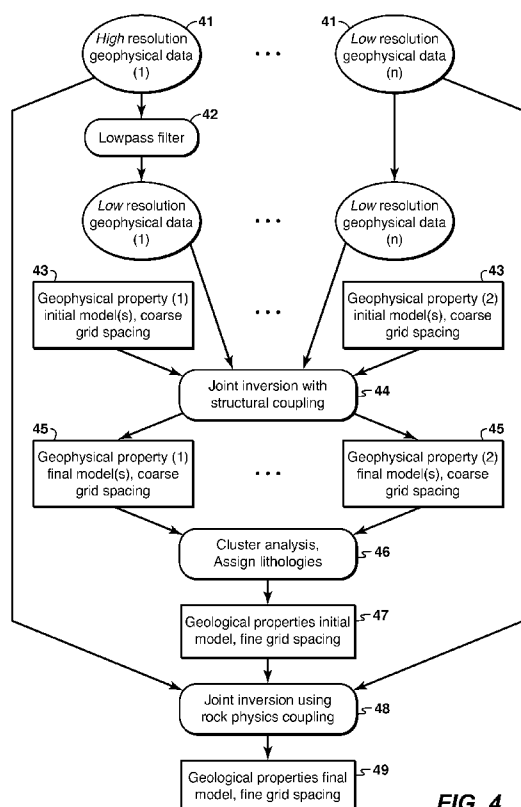


FIG. 4

(57) Abstract: Method for joint inversion of geophysical data to obtain 3-D models of geological parameters for subsurface regions of unknown lithology. Two or more data sets of independent geophysical data types are obtained, e.g. seismic and electromagnetic. Then they are jointly inverted, using structural coupling, to infer geophysical parameter volumes, e.g. acoustic velocity and resistivity. Regions of common lithology are next identified based on similar combinations of geophysical parameters. Then a joint inversion of the multiple data types is performed in accordance with the now-known lithology, and 3-D models of geological properties such as shale content and fracture density are inferred. The computational grid for the last inversion may be defined by the lithology regions, resulting in average geological properties over such regions, which may then be perturbed to determine uncertainty in lithologic boundaries.



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