

论文

用遗传有限单元法反演川滇下地壳流动对上地壳的拖曳作用

朱守彪^{1,2}, 石耀霖²,

1 北京大学地球物理学系, 北京 100871 2 中国科学院研究生院计算地球动力学重点实验室, 北京 100039

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摘要 利用震源机制解和地质调查资料, 运用伪三维遗传有限单元法反演了中国川滇部分地区(96°E~104°E, 22°N~30°N)受到的边界作用和该地区底部所受的剪切作用力. 对反演方法进行了讨论, 获得了稳定的反演结果. 结果显示, 该区川滇菱形块体上地壳底部受下地壳南南东向剪切力, 与GPS反映的现今地块运动方向大体一致; 而研究区域其他地区底部没有受到统一显著的剪切力作用. 结合该地区的研究资料, 初步认为青藏高原物质受挤压向东和东南运动过程中, 下地壳物质比上地壳更易于流动, 从而对川滇菱形块体上地壳有拖曳作用. 从应力场反演的模型位移与GPS实测的现今位移资料也大体吻合, 反映结果有合理的物理意义.

关键词 [遗传有限单元法](#) [地球物理反演](#) [应力场](#) [川滇菱形块体](#) [下地壳](#)

分类号

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Genetic algorithm finite element inversion of drag forces exerted by the lower crust on the upper crust in the Sichuan Yunnan area

ZHU Shou Biao^{1,2}, SHI Yao Lin²,

1 Department of Geophysics, Peking University, Beijing 100871, China 2 National Key Lab of Calculation Geodynamics, Chinese Academy of Sciences, Beijing 100039, China

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Abstract Based on data of focal mechanism and geological survey, the boundary forces and shear forces on the bottom of the upper crust are inverted with the pseudo 3D genetic algorithm finite element method (GA FEM) for the Sichuan Yunnan area (96°E~104°E, 22°N~30°N) in southwest China. The inversion method is discussed, and stable result is obtained. The result shows that the direction of shear forces on the bottom of the upper crust in the Sichuan Yunnan rhombus shape block applied by the lower crust is south southeast, which is consistent with the orientation of present crust movement revealed by GPS measurements in general, but significant shear forces are not found beneath the upper crust in other parts of the study area. Combined with other research results, we conclude that the lower crust drags the upper crust in the Sichuan Yunnan rhombus shape block since the lower crust is easy to flow than the upper crust in the process of mass movement toward east and southeast when the Tibetan Plateau is pushed. The model displacements inverted from the stress field agree with present displacements measured by GPS. It indicates that the inversion result is reasonable and has physical significance.

Key words [GA FEM](#); [Geophysical inversion](#); [Stress field](#); [Sichuan Yunnan rhombus shape block](#); [Lower crust](#).

通讯作者:

zhusb@pku.edu.cn

作者个人主页: 朱守彪^{1,2}; 石耀霖²;

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