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Rayleigh Inversion Application Study in Some Areas of Middle East

Peiming Li[1], Fuhao Jiang[1], Yimeng Zhang[1], Zhihui Yan[1], and Lieqian Dong[1]

[1]BGP, Zhuozhou, Hebei, China.

ABSTRACT

The near-surface structure is very complex in some areas of Middle East, where the investigation is relatively challengeable. This paper introduces the study of multi-channel Rayleigh wave inversion for near-surface structure in some areas of Middle East. Dispersive curve improvement ● Increase Rayleigh wave SNR To improve the low frequency S/N ratio of Rayleigh wave, multi-shots within near-offset are stacked, and Rayleigh waves are stacked in-phase within the acceptable error, so that the low frequency power and S/N ratio of Rayleigh wave could be improved. ● Optimize trace-selection based on frequency dispersion analysis Because the near-surface structures in the study areas change fast, so the locations & quantity of seismic traces are determined through the detailed analyses. Inversion result improvement ● Model building method optimization Rayleigh surface wave inversion has several model building methods based on the relation between phase-velocity and the depth transmitted from wave-length. In order to optimize the model building methods, three methods are compared with their inversion results in the study. The method with fixed layer number and fixed layer thickness shows more appreciated. ● Model depth optimization processing Three steps are adopted to optimize the model depth a. use the maximum depth to build model and inverse. b. adopt the dominant depth to build model and inverse. c. refine the models of the un-appreciated dispersive curves ● Inversion results processing The section with phase-velocity and depth display can't show the near-surface structure favorably, so one griding processing is done with the inversion results to improve some unsatisfying inversion results. At the same time, the inversion results can be transmitted into interval velocity. Results Through the analyses, aiming at Rayleigh surface shortage in seismic data, the solutions are applied and Rayleigh wave SNR is improved. The lowest frequency of dispersive curves is extended to (5-7)Hz from (8-10)Hz, and the detecting depth of Rayleigh wave is increased to (140-180)m from (100-120)m. Through the comparison, the building model method with fixed layer-number and fixed layer-thickness is the optimum. At the same time, in order to improve Rayleigh wave inversion precision, some feasible solutions are applied and good results are achieved.