Influence of Error in Estimating Anisotropic Parameters on VTI Depth Imaging

S. Y. Moussavi Alashloo[1], D. P. Ghosh[1], and W. Y. Wan Ismail[1]

[1]Center of Seismic Imaging, Universiti Teknologi PETRONAS, Sri Iskandar, Malaysia

Abstract

Thin layers in sedimentary rocks lead to seismic anisotropy which makes the wave velocity dependent to the propagation angle. This aspect causes errors in seismic imaging such as mispositioning of migrated events. One of the challenging issues in seismic imaging is the estimating of anisotropic parameters which usually has error due to dependency to several elements such as sparse data acquisition, erroneous data with low signal to noise ratio, etc. In this study, a fast marching eikonal solver is employed in isotropic and anelliptic VTI concept to obtain seismic traveltimes required for Kirchhoff depth migration algorithm. Another objective is to study the influence of anisotropic errors on the imaging. Comparing the isotropic and VTI traveltimes demonstrates a considerable lateral difference of wavefronts. After Kirchhoff imaging with true anisotropy and with a model including error, results show that the VTI algorithm with true anisotropic model produces images with perfect positioning and higher resolution than the isotropic one specifically in deeper parts. Furthermore, over or under-estimating anisotropy parameters up to 30 percent are acceptable for imaging, and beyond that cause considerable mispositioning.