Physics - Geophysics; Report Summarizes Geophysics Study Findings from University of Texas Austin (3D true-amplitude elastic wave-vector decomposition in heterogeneous anisotropic media)

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2023 FEB 7 (VerticalNews) -- By a News Reporter-Staff News Editor at Physics Week -- Data detailed on geophysics have been presented. According to news originating from Austin, Texas, by VerticalNews editors, the research stated, "Wave-mode separation aims at separating the elastic wavefield into P- and S-wave modes in each subsurface grid. Several wave-mode separation methods require the calculation of polarization vectors of different wave modes."

Our news reporters obtained a quote from the research from University of Texas Austin: "We propose a wave-mode separation method based on an analytical decomposition operator and a low-rank approximation in the wavenumber domain. When dealing with a general anisotropic medium with low symmetry, the two S-wave modes suffer from the singularity problem, where strong planar artifacts are caused due to the discontinuous polarization vectors at the singularities. A weight function with an adjustable threshold parameter can be designed to mitigate the strong artifacts, thereby obtaining clean S-wave modes. A larger threshold results in a stronger suppression of the artifacts but at the expense of stronger damages to S-wave energy. Here, we provide a new way to deal with the planar artifacts. The S-wave modes separated using a zero threshold containing strong artifacts can be treated as a noisy wavefield. Applying a weighting function can be viewed as a denoising process. Choosing the threshold parameter in the weighting function will inevitably cause amplitude loss of the signal. Thus, we can apply the local orthogonalization method to compensate for the amplitude loss."

According to the news editors, the research concluded: "Considering the heterogeneity of the wavefield, we propose to apply a non-stationary local orthogonalization method to obtain an accurate wave-mode separation. The final separated wavefields are true-amplitude and thus both kinematically and dynamically correct, which will benefit a variety of seismic forward and inverse problems. Several 3D synthetic examples demonstrate the performance of the new method."

For more information on this research see: 3D true-amplitude elastic wave-vector decomposition in heterogeneous anisotropic media. GEOPHYSICS, 2023. The publisher for GEOPHYSICS is Society of Exploration Geophysicists.

A free version of this journal article is available at https://doi.org/10.1190/geo2022-0361.1.

Our news journalists report that more information may be obtained by contacting Yangkang Chen, University of Texas Austin, John A. and Katherine G. Jackson School of Geosciences, **Bureau of Economic Geology**, Austin, Texas, United States. Additional authors for this research include Sergey Fomel.

Keywords for this news article include: University of Texas Austin, Austin, Texas, United States, North and Central America, Geophysics.

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