

Talk on “Full Azimuth Angle Domain Imaging: A Paradigm Solution” by Dr Colin David Chase, Paradigm Geophysical.

SPG Mumbai Chapter organized a talk of on “Full Azimuth Angle Domain Imaging: A Paradigm Solution” by Dr Colin David Chase, Paradigm Geophysical, a Development Software Manager responsible for ES360 Imaging, Processing and Visualization.

ES360 is a full azimuth decomposition, imaging, characterization and analysis system. The breakthrough with this approach is achieved through the decomposition of the seismic wavefield into full azimuth image gathers that carry both reflection data and directional (orientation) data. In depth domain migrations, all of the components of the recorded wavefield are mapped to the depth imaging point so that total energy for a given imaging point can be considered to be compromised of specular energy and the diffraction energy with the proportion of each depending on the geology. The decomposition of the seismic data is carried out in depth and in the local angle domain, the natural domain for constructing true subsurface full azimuth image gathers. Ray based angle migrations shoot rays from the imaging point upwards in order to select the input data samples to map back to the output

image point. This process produces 5D LAD table (opening angle, opening azimuth, dip, dip-azimuth & depth). Integrating depth samples along the opening angle - opening azimuth direction, 3D Direction Gather is generated. Similarly, integrating depth samples along the dip - dip azimuth direction, 3D Reflection Gather is generated, which further summing on opening azimuth gives 2D Angle Gather.

Specular energy having higher amplitude is focussed within a narrow range of specular dips. Diffraction energy, on the other hand will populate non-specular dips. Thus a transform filter can be generated to separate out specular energy & diffraction energy from the migrated pre-stack depth domain direction gather. This creates high resolution specular enhanced image and high resolution diffraction image depicting detailed fault definition.

These new data structures, e.g. full azimuth reflection and directional gathers can be used to drive inversion processes (AVAZ, velocity inversion for anisotropic parameters) that produce attribute volumes, maps and models suitable for making stress orientation and intensity determinations.

