

ABSTRAK

ANALISIS PERBANDINGAN MIGRASI *FINITE DIFFERENCE* DAN MIGRASI KIRCHHOFF UNTUK PENINGKATAN KUALITAS PENAMPANG PADA DATA SEISMIK 2D *MARINE*

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Seiring meningkatnya kebutuhan energi global, kegiatan eksplorasi sumber daya alam semakin intensif sehingga diperlukan metode pencitraan bawah permukaan yang akurat. Metode seismik menjadi salah satu metode geofisika utama dalam eksplorasi karena mampu menggambarkan kondisi geologi bawah permukaan secara detail. Salah satu tahapan penting dalam pengolahan data seismik adalah migrasi, yaitu proses untuk mengembalikan posisi reflektor dan energi difraksi ke lokasi sebenarnya agar penampang menjadi lebih representatif. Penelitian ini bertujuan membandingkan hasil migrasi *Finite Difference* dan migrasi Kirchhoff pada data seismik 2D *marine* Lintasan L16.1 di Perairan Arafura, Papua Barat. Perbandingan dilakukan berdasarkan resolusi lateral, kontinuitas reflektor, pemfokusan energi difraksi, serta kemampuan menggambarkan reflektor miring. Metode Kirchhoff bekerja dengan menjumlahkan amplitudo sepanjang lintasan difraksi dan mampu memigrasikan struktur dengan sudut yang luas. Sementara itu, metode *Finite Difference* menggunakan pendekatan *downward continuation* dalam pemecahan persamaan gelombang dan relatif stabil terhadap data dengan rasio sinyal terhadap *noise* tertentu. Hasil penelitian menunjukkan bahwa migrasi Kirchhoff dengan *aperture* 344 m memberikan penampang terbaik, ditandai oleh resolusi lateral yang tajam, kontinuitas reflektor yang baik, serta pemfokusan difraksi yang optimal. Dengan demikian, migrasi Kirchhoff *aperture* 344 m dinilai paling efektif dalam meningkatkan kualitas penampang seismik. Metode ini merepresentasikan kondisi geologi daerah penelitian secara lebih jelas dan akurat.

Kata Kunci: processing seismik, migrasi Kirchhoff, migrasi *finite difference*

ABSTRACT

A COMPARATIVE ANALYSIS OF FINITE DIFFERENCE MIGRATION AND KIRCHHOFF MIGRATION FOR IMPROVING CROSS-SECTION QUALITY IN 2D MARINE SEISMIC DATA

By

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As global energy demand continues to rise, natural resource exploration has become increasingly intensive, thereby requiring accurate subsurface imaging methods. Seismic methods are among the primary geophysical techniques used in exploration because they are capable of depicting subsurface geological conditions in detail. One of the critical stages in seismic data processing is migration, which aims to relocate reflectors and diffraction energy to their true positions so that the resulting seismic section becomes more representative of the subsurface. This study aims to compare the results of Finite Difference migration and Kirchhoff migration applied to 2D marine seismic data from Line L16.1 in the Arafura Sea, West Papua. The comparison is based on lateral resolution, reflector continuity, diffraction energy focusing, and the ability to image dipping reflectors. The Kirchhoff method works by summing amplitudes along diffraction paths and is capable of imaging structures over a wide range of angles. In contrast, the Finite Difference method employs a downward continuation approach in solving the wave equation and is relatively stable for data with a certain signal-to-noise ratio. The results show that Kirchhoff migration with a 344 m aperture produces the best seismic section, as indicated by sharper lateral resolution, better reflector continuity, and more optimal diffraction focusing. Therefore, the Kirchhoff migration method with a 344 m aperture was found to be the most effective for improving the quality of the seismic section. This method provides a clearer and more accurate representation of the geological conditions in the study area.

Keywords: *seismic processing, Kirchhoff migration, finite difference migration*