

# Reduksi coherent noise pada data magnetotellurik menggunakan metode continuous wavelet transform berbasis MATLAB = Coherent noise reduction in magnetotelluric data using continuous wavelet transform method based on MATLAB

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## Abstrak

Keberadaan noise pada data magnetotellurik dapat membiaskan hasil interpretasi. Noise ini dapat eliminasi dibutuhkan remote station yang jauh dar lokasi pengukuran dan bebas dari interferensi. Remote station diasumsikan bahwa terbebas dari noise, sehingga data dari remote station dapat digunakan untuk mereduksi noise pada stasiun pengukuran. Akan tetapi penambahan remote station ini akan meningkatkan biaya operasional eksplorasi dan juga akan membutuhkan banyak waktu serta sulit untuk mencari lokasi yang terbebas dari noise, terutama pada eksplorasi geothermal dikarenakan area di Indonesia yang biasanya memiliki medan dan akses sulit dilalui. Oleh karena itu, diperlukan teknologi yang dapat mengreduksi noise pada data magnetotellurik dan meningkatkan kualitas data sehingga dapat mengurangi biaya dan waktu dalam eksplorasi. Melalui metode continuous wavelet transform, data magnetotellurik yang terkontaminasi noise dapat direduksi tanpa ada bantuan remote station dan akan menyebabkan eksplorasi geothermal menjadi lebih efisien. Metode continuous wavelet transform mengolah data magnetotellurik berupa time series domain yang masih belum difilter dan mengubah data time series domain tersebut ke dalam time-frequency domain. Pengubahan menjadi time-frequency menggunakan metode continuous wavelet transform untuk dianalisis keberadaan noisenya pada frekuensi dan waktu kemunculan noise yang kemudian dihilangkan. Data yang telah dihilangkan akan dapat diolah menjadi apparent resistivity dan fase vs frekuensi. Hasil filter yang telah dilakukan dibandingkan dengan pengolahan software komersil. Dimana filter berhasil menghilangkan keberadaan noise transient yang muncul dengan kisaran frekuensi 30-400 Hz dan kemunculan selama 0.2-0.4 detik. Sehingga filter ini dapat menjadi alternatif lain dalam penghilangan noise pada data magnetotellurik.

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The presence of noise in magnetotelluric data can produce a bias in its interpretation. To eliminate this noise, a remote station that is far from interference is needed. Assuming that the remote station is almost free from noise, the data from remote station can be used to reduce the noise from measurement station. However, adding an additional station means there will be an increase in exploration cost. Also, adding a remote station itself can be challenging and time-wasting since finding an area that is free from interference is quite hard to do, especially for geothermal exploration area in Indonesia that usually have difficult terrain and access. To answer this, we need a technology that can reduce noise from magnetotelluric data and improve the data quality while keeping the cost and time of exploration as low as possible. By using continuous wavelet transform method, the noise from magnetotelluric data can be reduced without the need to use a remote station which makes exploration becomes more efficient. The continuous wavelet transform method processes magnetotelluric data from unfiltered time series domain and changes the domains time series data into a time-frequency domain. Changing processes to a time-frequency uses the continuous wavelet transform method to analyze the existence of the frequency and time of occurrence of noise which is

then removed. Data that has been removed will be processed into apparent resistivity and phase vs frequency. The filter results have been done compared to commercial software processing. Where the filter successfully eliminates the presence of transient noise that appears with a frequency range of 30-400 Hz and emergence for 0.2-0.4 seconds. So this filter can be another alternative in noise removal in magnetotelluric data.