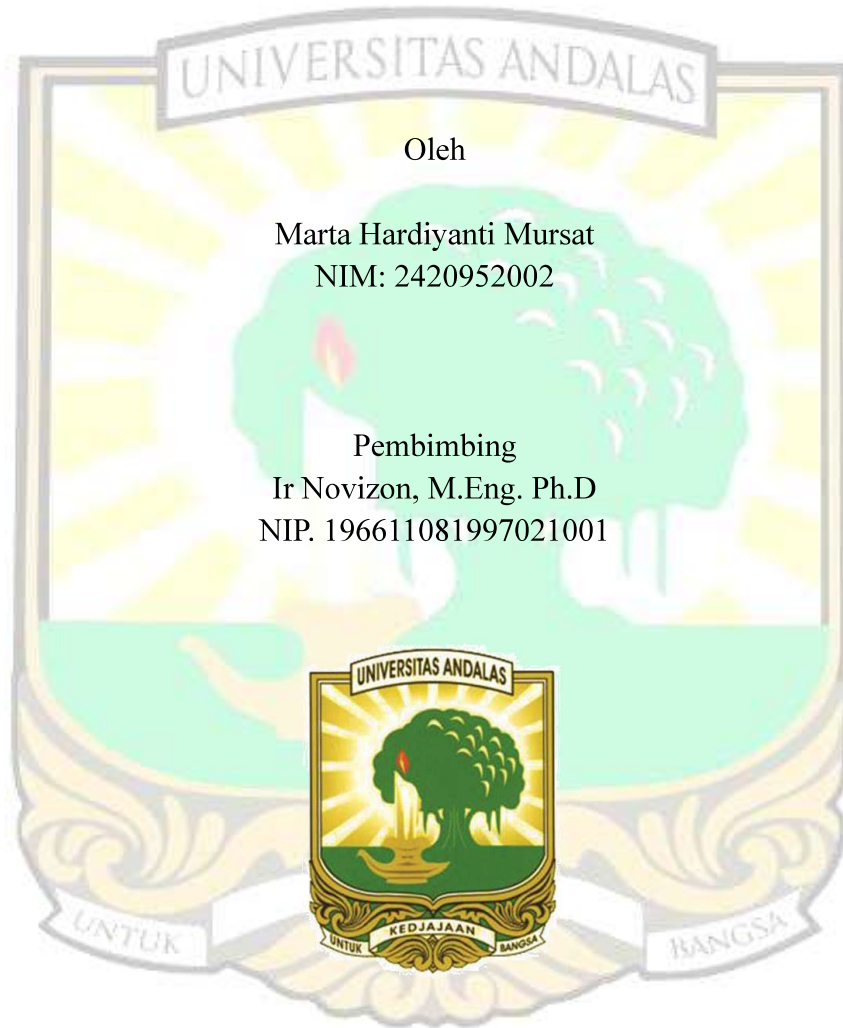


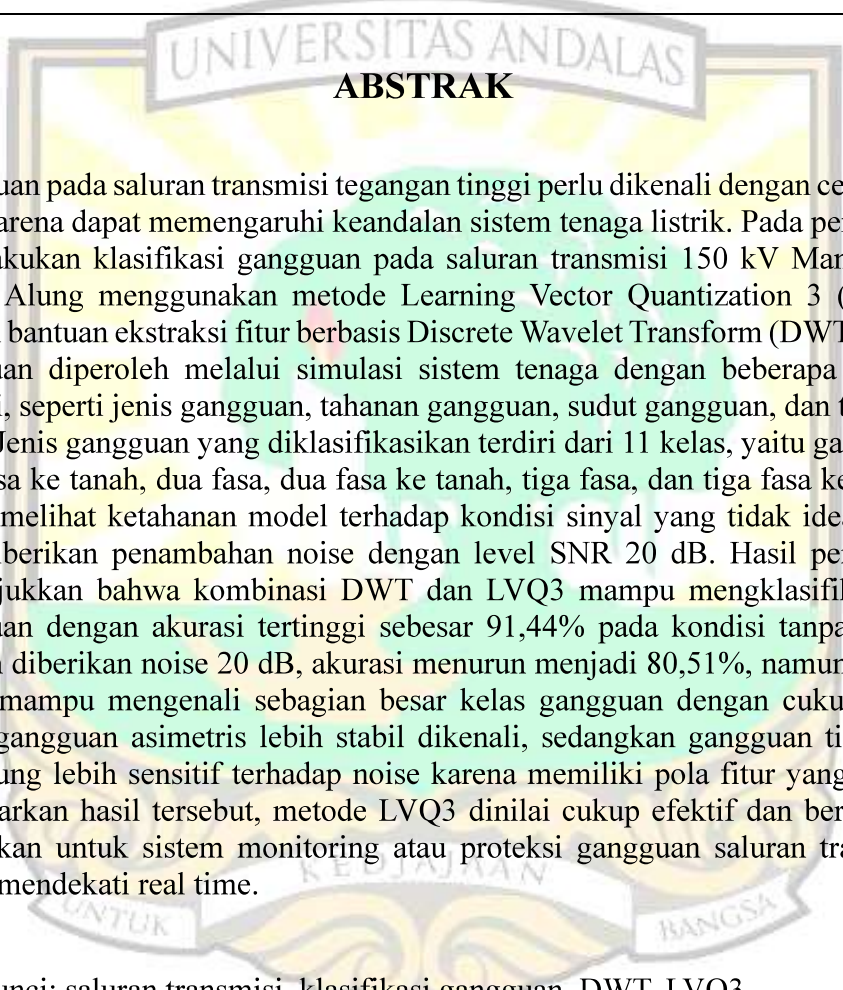
**KLASIFIKASI GANGGUAN PADA SALURAN TRANSMISI TEGANGAN
TINGGI MENGGUNAKAN AUGMENTASI DATA BERBASIS
LVQ NEURAL NETWORK**

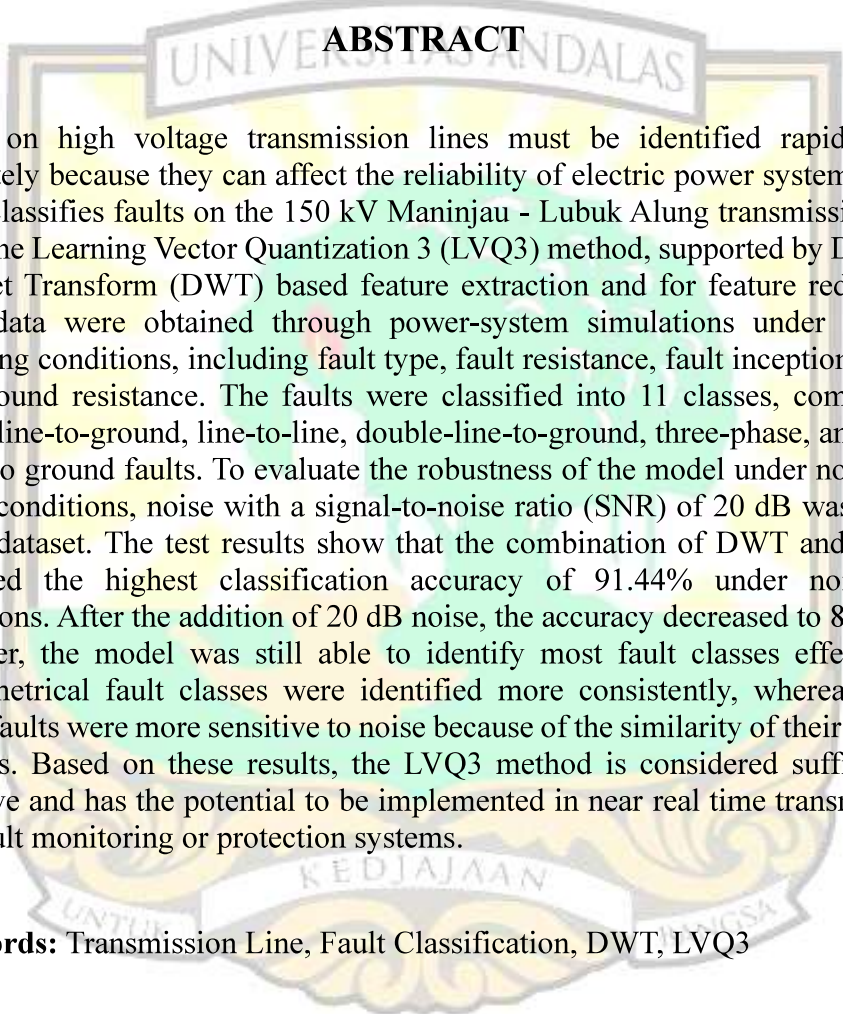
TESIS

Karya Ilmiah sebagai salah satu syarat untuk menyelesaikan jenjang strata dua
(S-2) di Departemen Teknik Elektro, Fakultas Teknik, Universitas Andalas



**Program Studi Megister
Teknik Elektro Fakultas Teknik
Universitas Andalas
2026**

Judul	Klasifikasi Gangguan pada Saluran Transmisi Tegangan Tinggi Menggunakan Augmentasi Data Berbasis LVQ Neural Network	Marta Hardiiyanti Mursat
Program Studi	Teknik Elektro	2420952002
Fakultas Teknik Universitas Andalas		
 ABSTRAK Gangguan pada saluran transmisi tegangan tinggi perlu dikenali dengan cepat dan tepat karena dapat memengaruhi keandalan sistem tenaga listrik. Pada penelitian ini dilakukan klasifikasi gangguan pada saluran transmisi 150 kV Maninjau - Lubuk Alung menggunakan metode Learning Vector Quantization 3 (LVQ3) dengan bantuan ekstraksi fitur berbasis Discrete Wavelet Transform (DWT). Data gangguan diperoleh melalui simulasi sistem tenaga dengan beberapa variasi kondisi, seperti jenis gangguan, tahanan gangguan, sudut gangguan, dan tahanan tanah. Jenis gangguan yang diklasifikasikan terdiri dari 11 kelas, yaitu gangguan satu fasa ke tanah, dua fasa, dua fasa ke tanah, tiga fasa, dan tiga fasa ke tanah. Untuk melihat ketahanan model terhadap kondisi sinyal yang tidak ideal, data juga diberikan penambahan noise dengan level SNR 20 dB. Hasil pengujian menunjukkan bahwa kombinasi DWT dan LVQ3 mampu mengklasifikasikan gangguan dengan akurasi tertinggi sebesar 91,44% pada kondisi tanpa noise. Setelah diberikan noise 20 dB, akurasi menurun menjadi 80,51%, namun model masih mampu mengenali sebagian besar kelas gangguan dengan cukup baik. Kelas gangguan asimetris lebih stabil dikenali, sedangkan gangguan tiga fasa cenderung lebih sensitif terhadap noise karena memiliki pola fitur yang mirip. Berdasarkan hasil tersebut, metode LVQ3 dinilai cukup efektif dan berpotensi digunakan untuk sistem monitoring atau proteksi gangguan saluran transmisi secara mendekati real time. Kata kunci: saluran transmisi, klasifikasi gangguan, DWT, LVQ3		

Title	Fault Classification on High Voltage Transmission Lines Using LVQ Neural Network-Based Data Augmentation	Marta Hardiiyanti Mursat
Study Program	Electrical Engineering	2420952002
Faculty of Engineering Universitas Andalas		
 ABSTRACT Faults on high voltage transmission lines must be identified rapidly and accurately because they can affect the reliability of electric power systems. This study classifies faults on the 150 kV Maninjau - Lubuk Alung transmission line using the Learning Vector Quantization 3 (LVQ3) method, supported by Discrete Wavelet Transform (DWT) based feature extraction and for feature reduction. Fault data were obtained through power-system simulations under various operating conditions, including fault type, fault resistance, fault inception angle, and ground resistance. The faults were classified into 11 classes, comprising single-line-to-ground, line-to-line, double-line-to-ground, three-phase, and three phase to ground faults. To evaluate the robustness of the model under non-ideal signal conditions, noise with a signal-to-noise ratio (SNR) of 20 dB was added to the dataset. The test results show that the combination of DWT and LVQ3 achieved the highest classification accuracy of 91.44% under noise-free conditions. After the addition of 20 dB noise, the accuracy decreased to 80.51%; however, the model was still able to identify most fault classes effectively. Asymmetrical fault classes were identified more consistently, whereas three phase faults were more sensitive to noise because of the similarity of their feature patterns. Based on these results, the LVQ3 method is considered sufficiently effective and has the potential to be implemented in near real time transmission line fault monitoring or protection systems. Keywords: Transmission Line, Fault Classification, DWT, LVQ3		