

ANALISIS KUAT GESER TANAH GAMBUT YANG DISTABILISASI GEOPOLIMER BERBAHAN DASAR POFA PADA UJI GESER LANGSUNG

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ABSTRAK

Tanah gambut merupakan jenis tanah dengan kandungan organik tinggi, daya dukung rendah, serta potensi pemampatan besar sehingga kurang mendukung untuk konstruksi. Salah satu upaya perbaikan sifat mekaniknya adalah melalui stabilisasi menggunakan geopolimer berbahan dasar *Palm Oil Fuel Ash* (POFA). Penelitian ini bertujuan untuk menganalisis pengaruh variasi kadar POFA (10%, 15%, 20%, dan 25%) terhadap kuat geser tanah gambut dengan metode *Direct Shear Test* setelah pemeraman 7 dan 14 hari. Sampel tanah gambut diambil dari Desa Rantau Indah, Kabupaten Tanjung Jabung Timur, Provinsi Jambi, sedangkan POFA diperoleh dari PT. Muara Jambi Sawit Lestari.

Hasil penelitian menunjukkan bahwa penambahan geopolimer POFA mampu meningkatkan kohesi tanah gambut secara signifikan, terutama pada kadar 10% dan 15% setelah pemeraman 14 hari. Nilai kohesi meningkat dari 0,011 kg/cm² pada tanah asli menjadi 0,034–0,053 kg/cm² pada tanah yang distabilisasi. Namun, nilai sudut geser dalam cenderung menurun dibandingkan tanah asli (28,76°), dengan nilai tertinggi pada 25% POFA pemeraman 7 hari sebesar 28,44° dan menurun menjadi 21,00° pada 14 hari. Secara keseluruhan, peningkatan kuat geser lebih banyak dipengaruhi oleh kenaikan kohesi dibandingkan sudut geser dalam. Variasi POFA 10%–15% dinilai paling stabil untuk aplikasi jangka panjang.

Kata kunci: tanah gambut, geopolimer, POFA, stabilisasi tanah, kuat geser langsung.

SHEAR STRENGTH ANALYSIS OF PEAT SOIL STABILIZED WITH POFA-BASED DEOPOLIMER USING DIRECT SHEAR TEST

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ABSTRACT

Peat soil is characterized by high organic content, low bearing capacity, and high compressibility, making it unsuitable for construction purposes. One method to improve its mechanical properties is stabilization using geopolymer derived from Palm Oil Fuel Ash (POFA). This study aims to analyze the effect of POFA variations (10%, 15%, 20%, and 25%) on the shear strength of peat soil through the Direct Shear Test after 7 and 14 days of curing. The peat soil samples were collected from Rantau Indah Village, Tanjung Jabung Timur Regency, Jambi Province, while the POFA was obtained from PT. Muara Jambi Sawit Lestari.

The results showed that the addition of POFA-based geopolymer significantly improved the cohesion of peat soil, particularly at 10% and 15% after 14 days of curing. The cohesion value increased from 0.011 kg/cm² in natural peat to 0.034–0.053 kg/cm² in stabilized soil. However, the internal friction angle tended to decrease compared to natural peat (28.76°), with the highest value at 25% POFA after 7 days of curing (28.44°), which then decreased to 21.00° after 14 days. Overall, the improvement in shear strength was more influenced by cohesion rather than the internal friction angle. The POFA variation of 10%–15% was found to be the most stable for long-term applications.

Keywords: peat soil, geopolymer, POFA, soil stabilization, direct shear strength.