INTISARI

Penelitian ini membahas studi eksperimental perilaku Dinding Penahan Tanah (DPT) modular sambungan tiga titik dibandingkan dengan DPT konvensional pada kondisi tanah pasir. Latar belakang penelitian didasari oleh keterbatasan DPT konvensional yang membutuhkan waktu konstruksi lama, tenaga kerja besar, serta kurang fleksibel terhadap kondisi lapangan. Sebagai alternatif, sistem modular *interlocking* menawarkan efisiensi konstruksi dan kemudahan perakitan, dengan potensi peningkatan stabilitas terhadap tekanan lateral tanah.

Metode penelitian dilakukan melalui uji laboratorium berskala kecil menggunakan model DPT berbahan beton pracetak berukuran 20 × 10 × 5 cm, baik tipe sambungan tiga titik maupun tanpa sambungan. Pengujian dilakukan dengan pembebanan statis bertahap menggunakan *jack hydraulic*, dan pergeseran horizontal serta vertikal diukur melalui *dial gauge* yang terhubung dengan *data logger*. Variasi tinggi dinding dibuat dengan jumlah tumpukan dua hingga lima lapis (0,10–0,25 m). Analisis dilakukan untuk menilai hubungan antara tinggi dinding, gaya lateral, serta *displacement* yang terjadi.

Hasil penelitian menunjukkan bahwa DPT sambungan tiga titik (ST) memiliki *displacement* lebih kecil dibandingkan DPT tanpa sambungan (TS) pada beban yang sama, menandakan peningkatan kekakuan dan kestabilan struktur. Mekanisme deformasi yang dominan pada ST berubah dari sliding pada tiga tumpukan menjadi kombinasi sliding-guling pada empat tumpukan, dan guling terkendali pada lima tumpukan. Sebaliknya, DPT konvensional lebih cepat mengalami guling seiring peningkatan ketinggian. Hal ini membuktikan bahwa sistem interlocking sambungan tiga titik mampu meningkatkan resistansi terhadap gaya lateral dan momen guling, sehingga lebih efisien dan stabil untuk diaplikasikan dilapangan.

Kata kunci: dinding penahan tanah, sistem modular, sambungan tiga titik, pembebanan statis, stabilitas lereng

ABSTRACT

This research presents an experimental study on the behavior of modular retaining walls with three-point interlocking joints, compared to conventional retaining walls under sand soil conditions. The study is motivated by the limitations of conventional retaining walls, which require longer construction time, higher labor intensity, and limited adaptability to field conditions. As an alternative, the modular interlocking system offers improved construction efficiency and flexibility, while potentially enhancing stability against lateral earth pressure.

The experiment was conducted through small-scale laboratory tests using precast concrete wall models measuring 20 × 10 × 5 cm, both with three-point interlocking joints and without joints. A static incremental loading was applied using a hydraulic jack, while horizontal and vertical displacements were measured with dial gauges connected to a data logger. The wall heights were varied from two to five layers (0.10–0.25 m). The analysis focused on evaluating the relationship between wall height, lateral force, and displacement response.

The results indicate that the three-point interlocking retaining wall (ST) exhibited smaller displacements than the conventional wall (TS) under equivalent loading, showing greater stiffness and stability. The deformation mechanism of ST transitioned from sliding at three layers to combined sliding–overturning at four layers, and controlled overturning at five layers. In contrast, the conventional wall tended to fail by overturning as the height increased. These findings demonstrate that the three-point interlocking system effectively improves resistance against lateral forces and overturning moments, making it a more stable and efficient alternative for practical field applications.

Keywords: retaining wall, modular system, three-point interlocking, static loading, slope stability