IIS UNIVERSITY OF TOKYO
GDM

Effect of spacing of transverse members on pullout resistance of a square-shaped geocell embedded in sandy and gravelly materials

Christian HAUSSNER

Geo-disaster Mitigation Engineering

Experimental Outline

In order to study the influence of the spacing of the transverse members (S) on the pullout resistance of a square-shaped geocell, a series of pullout tests were conducted on small scale models using four square-shaped geocells with varying spacing between transverse members. The geocells were embedded independently in silica sand (D_{50}=0.25 mm) and gravel No.1 (D_{50}=3.2 mm). All the tests were subjected to a 1kPa surcharge.

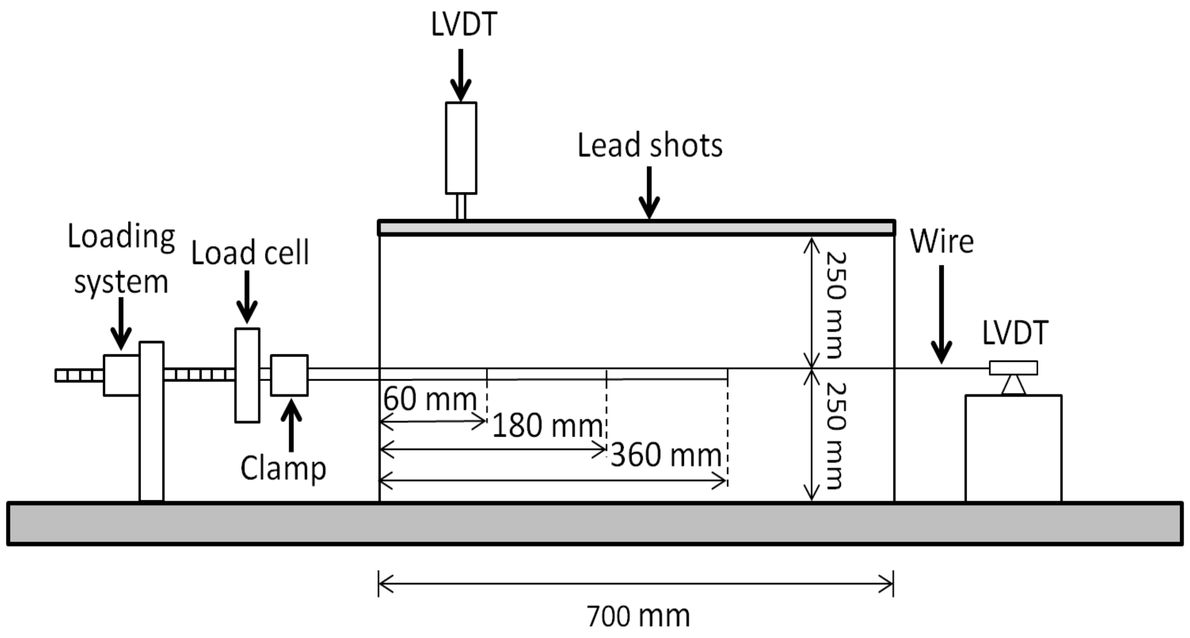


Fig. 1 Schematic diagram of pullout test apparatus

Pullout resistance of square-shaped geocell with varying spacing

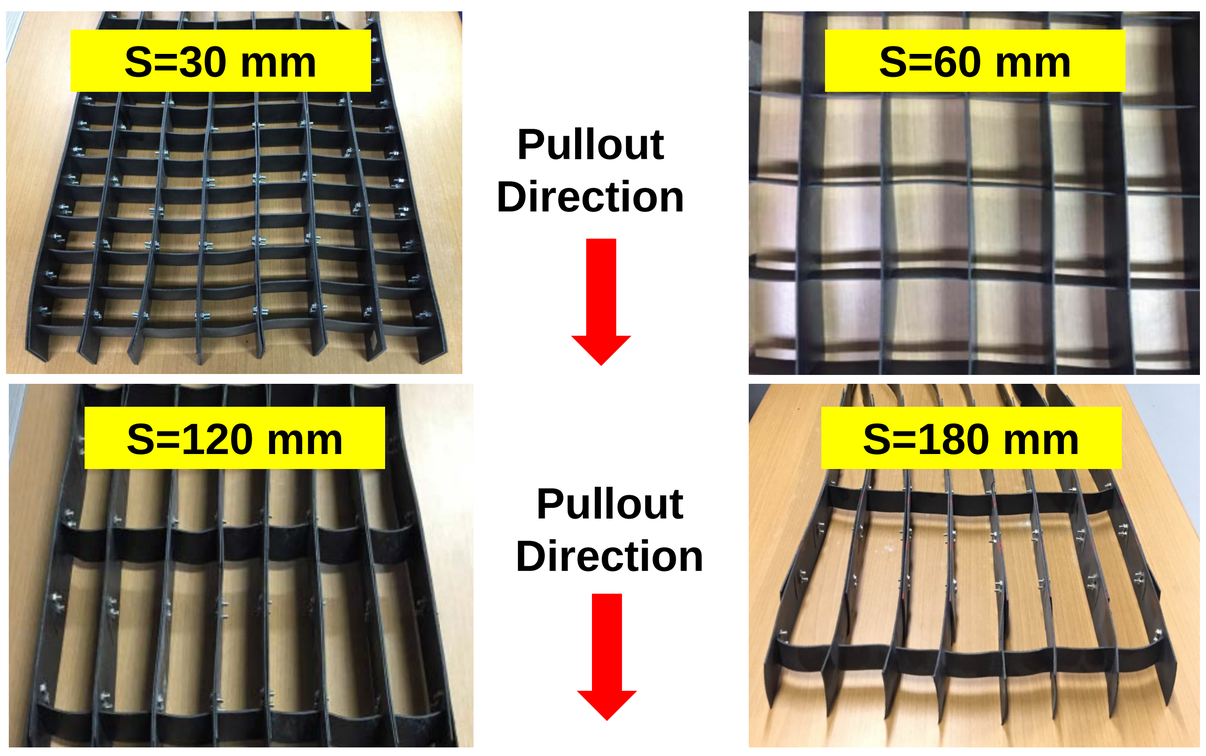
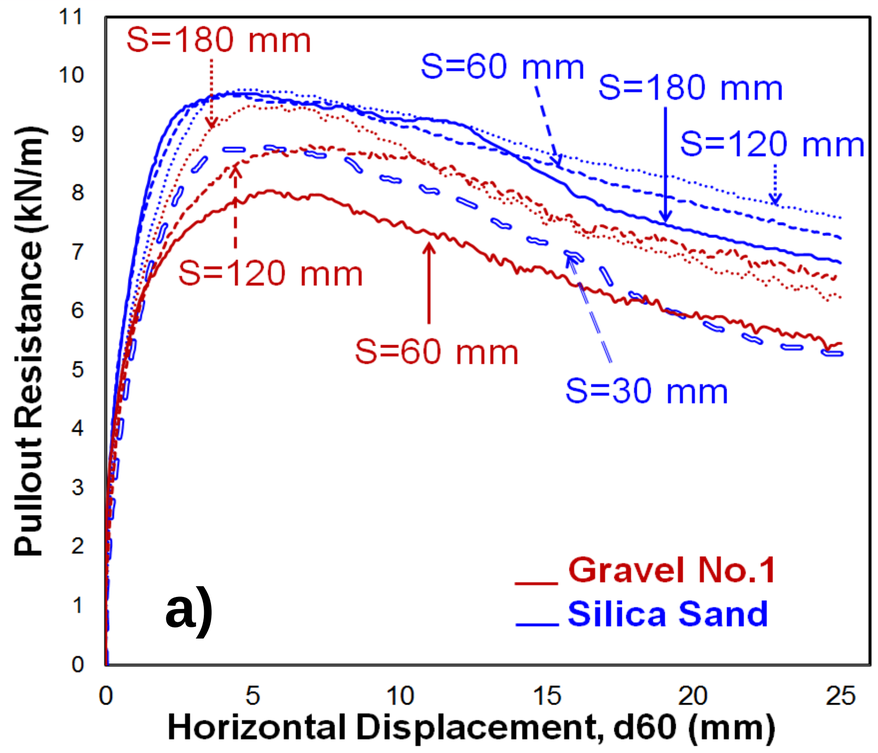


Fig. 2 Square-shaped geocells with varying spacing between transverse members

Fig. 3a indicates that for silica sand, the square-shaped geocells of S=60mm, 120mm and 180mm show similar peak values and softening behavior, while for gravel No.1, the peak pullout resistance increases as the spacing of the transverse members increases.

As summarized in Fig. 3b, for silica sand, the pullout resistance reaches its maximum when S= 60mm, and it doesn't increase any further. For gravel No. 1, however, increasing the spacing of the transverse members yields larger peak pullout resistances.



The pullout resistance is governed by the combination of both the shear resistance along the backfill – geocell interfaces and the passive resistance developed within each geocell (fig 4.) In this sense, a larger spacing is needed for larger particles to fully deform and so to achieve its maximum passive resistance and mobilize a higher pullout resistance.

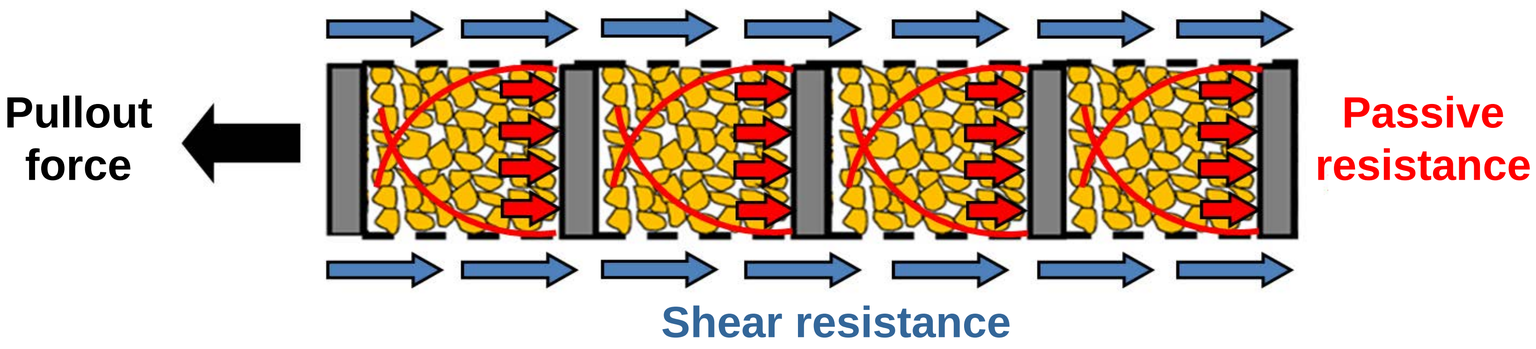


Fig. 4 Schematic pullout mechanism

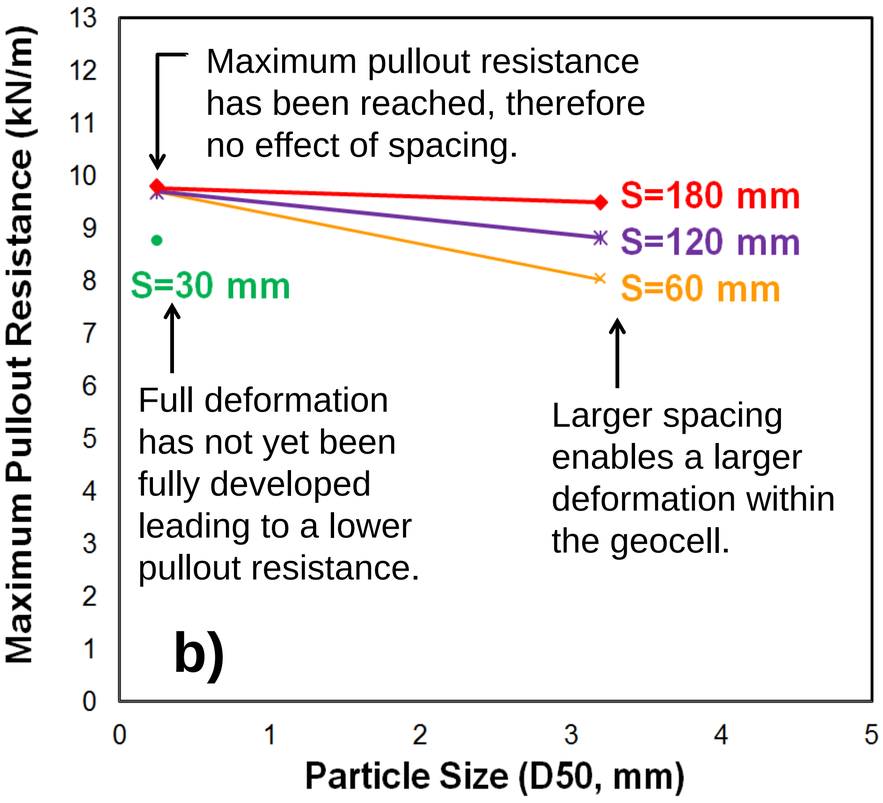


Fig. 3 a) Horizontal displacement against pullout resistance, **b)** Particle size against pullout resistance