IIS UNIVERSITY OF TOKYO
GDM

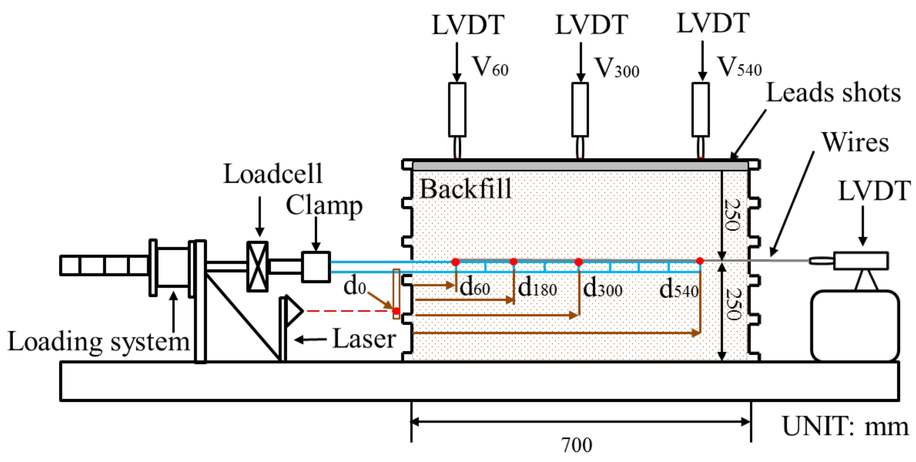
Stress-deformation characteristics of diamond-shaped geocell and square-shaped geocell

Xinye. HAN

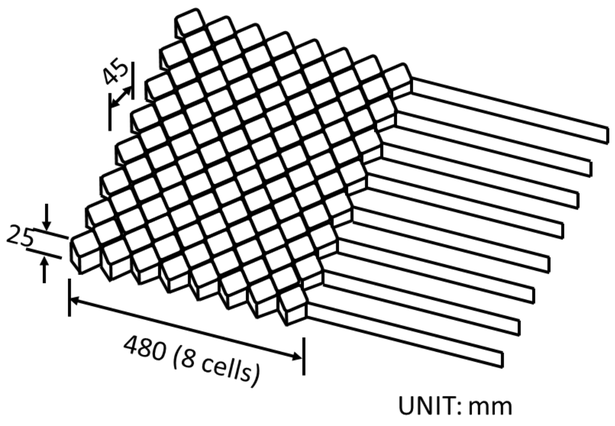
Geo-disaster Mitigation Engineering

Research Objective

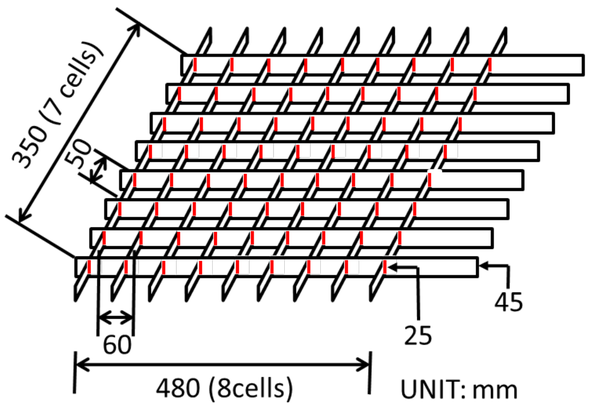
Geocells, which are traditionally made by the **diamond pattern**, have been widely applied as **base reinforcements** in many fields such as roads, embankments, etc. However, the traditional diamond-shaped geocells have never been used as **tensile reinforcements** to retaining walls. In this study, two models of geocell (**diamond-shaped geocell** and **square-shaped geocell**) were tested in pullout experiments.



Schematic diagram of pullout test apparatus



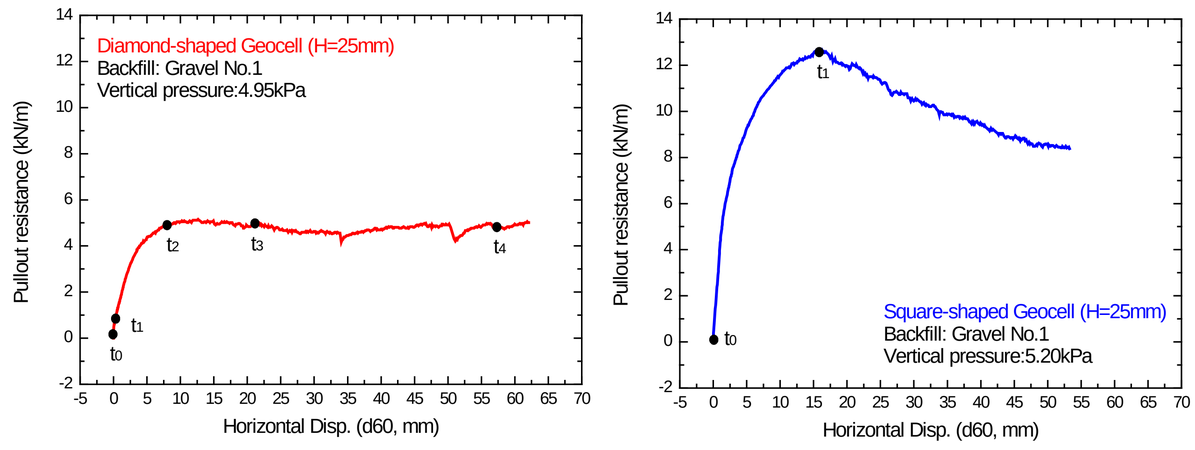
Diamond-shaped geocell



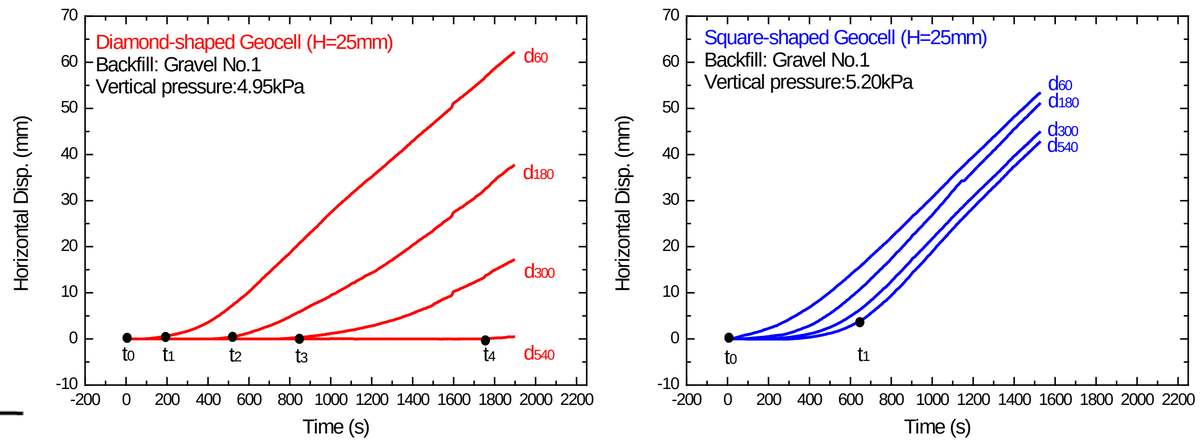
Square-shaped geocell

Pullout Test Results

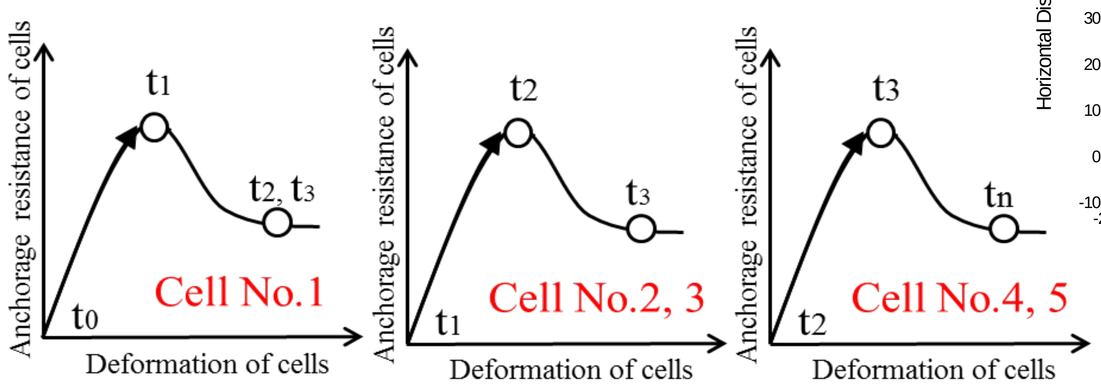
- Square-shaped geocell shows both **higher peak pullout resistance** and **initial stiffness** than diamond-shaped geocell.
- Diamond-shaped geocell exhibits **strain-hardening** behavior, while square-shaped geocell exhibits higher peak strengths at large displacements (16mm), followed by noticeable **strain-softening**.
- **Stress-deformation mechanism**
  - Diamond-shaped geocell shows **significantly progressive** deformation.
  - Square-shaped geocell shows **slightly or non-progressive** deformation.



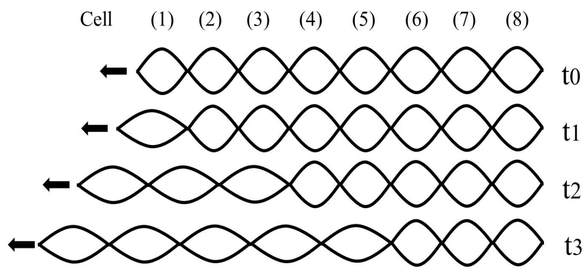
Pullout resistance against horizontal displacements (d_{60})



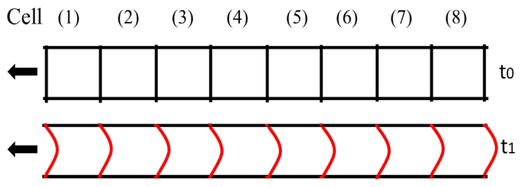
Horizontal displacement along geocell versus time history



Schematic diagram of stress-deformation mechanism of diamond-shaped geocell

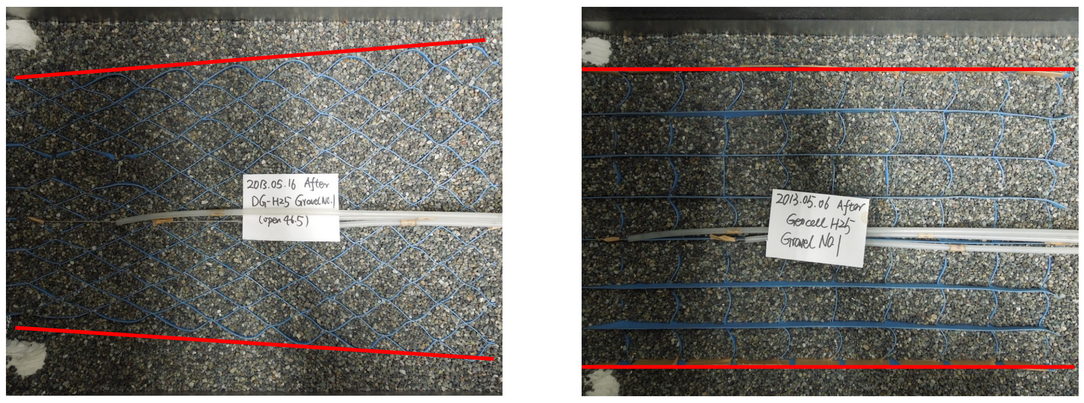


Diamond-shaped geocell



Square-shaped geocell

Schematic diagram of deformation status vary with time history



After tests, the deformation state of diamond-shaped geocell and square-shaped geocell

➢ **Diamond-shaped geocell shows progressive deformation which induces much lower peak pullout resistance and initial stiffness than square-shaped geocell.**