

ジオマネジメント工学講座 土木施工システム工学分野

– Toward experimentally realizable theories for efficient predictions of mechanical ground behaviors –

キーワード

斜面安定，液状化，露天掘り，センサ開発

研究方針

- 当分野では斜面安定解析の研究に従事し，地盤や土構造物の挙動予測への精度向上および効率化を目的とした材料特性実験を始め，物理模型実験，地盤構成則，数値計算手法および現場適用に関する研究課題に取り組んでいる．同時に、国際共同研究を通じて，現地問題解決に向けた適応可能な技術を開発し，地下エネルギー資源開発，地域地盤環境，自然災害予測への研究成果の活用によって，地盤力学分野に貢献している．



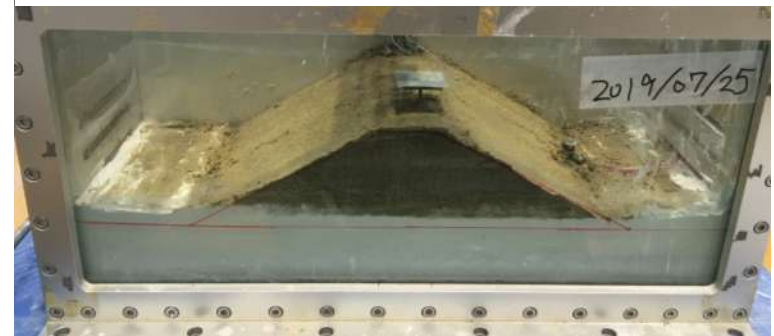
教員

ピパットポンサー・ティラポン
准教授
PIPATPONGSA Thirapong
Assoc. Prof.

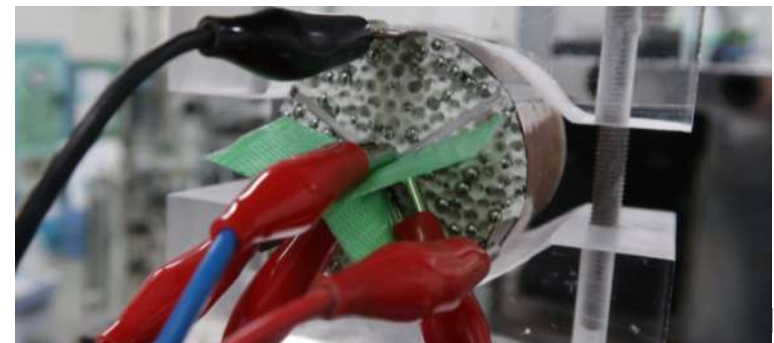
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鉱山における斜面の安定性



盛土内の液状化現象

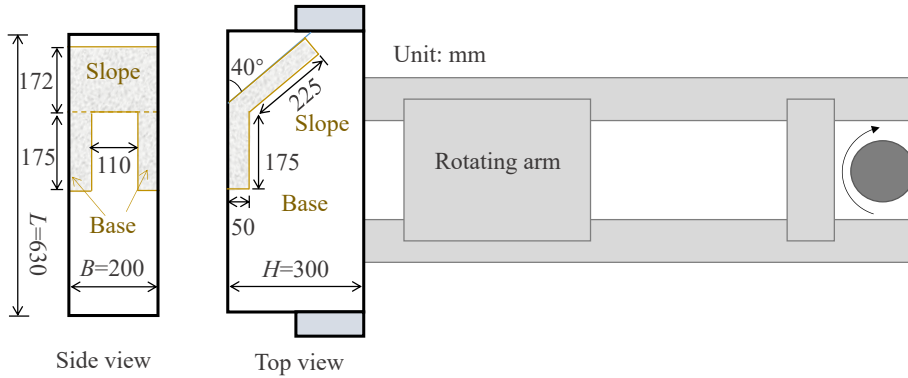


多次元応力の測定手法

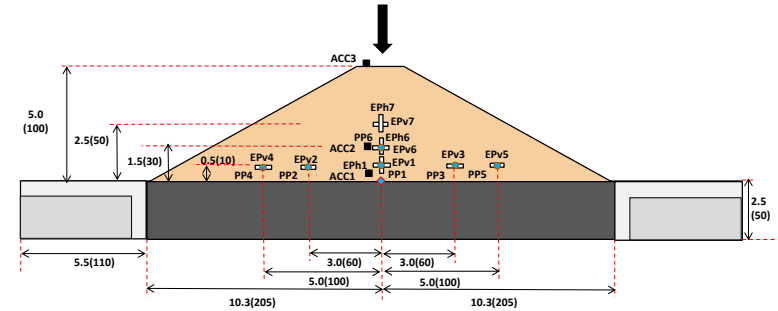
Specialized research methods

Physical modelling of undercut slope

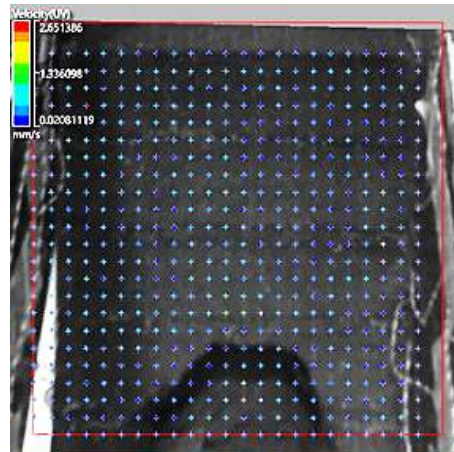
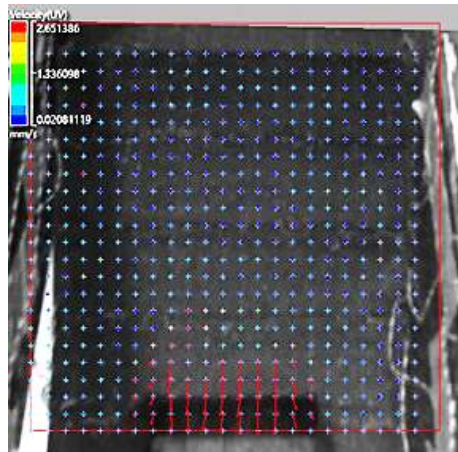
Physical modelling of embankment



Centrifugal undercut slope model



Centrifugal embankment model



Surface velocity during and after failure



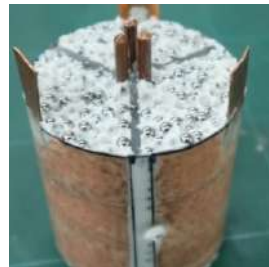
Preparation of embankment model in a soil chamber subjected to 50g acceleration

Recent research works

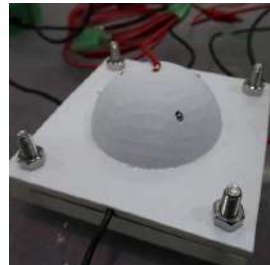
- Development of geo-stress sensing device using conductive particles
Measurement of three-dimensional state of stress can reduce risks in geotechnical engineering, thus this research aims to enhance high-value specific applications of pressure-sensitive conductive granules for developing the device enabling to measure 3D stress tensors in which the existing techniques cannot work well.



Loading/unloading test of a disc-shaped prototype



Cylindrical shape



Semi-circular shape

- Applicability of undercut slope technique to open-pit mine
This work involves in a successful case study where applications of theoretical and numerical predictions for a massive excavation have been undertaken at the site. A stable arch formed across a pit is beneficial to the design of an undercut slope; therefore, prediction of the maximum stable undercut width under which the slope does not collapse is a challenging problem.

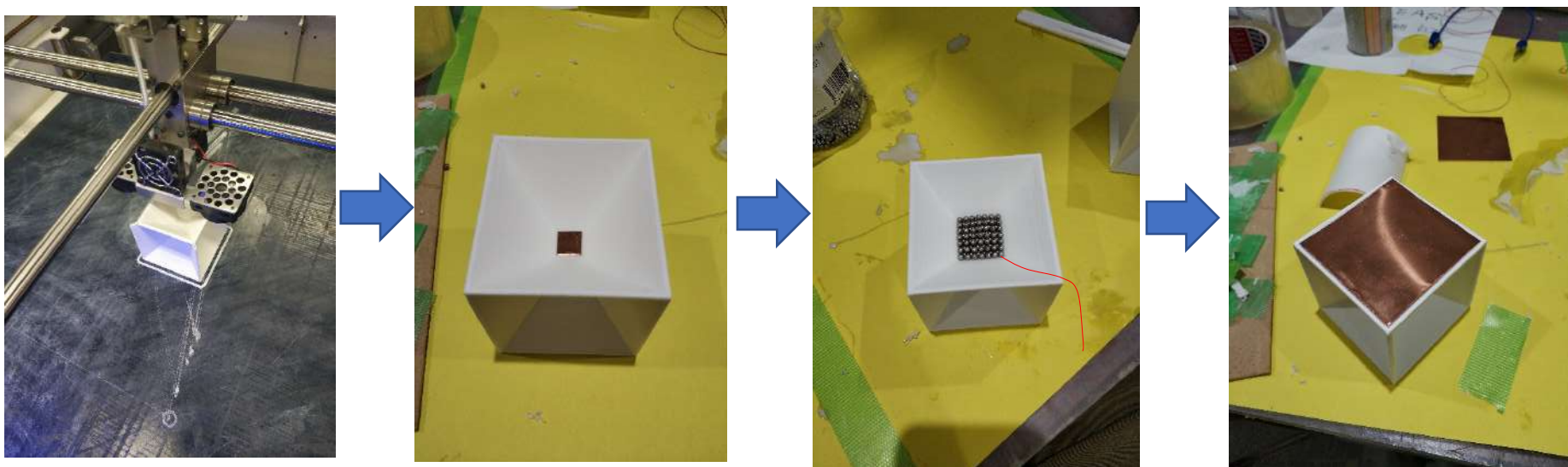


Actual engineering practice to Mae Moh open-pit mine of Thailand

Recent thesis supervision (博士)

D1 Zirui LU

Three-dimensional stress measurement technique based on electrical resistivity tomography in conductive spheres

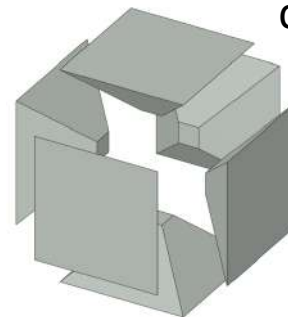
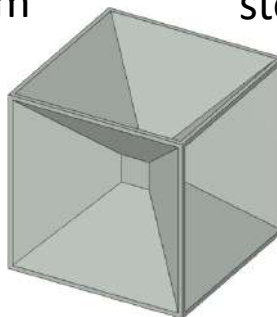


Make a container by 3D printer

Stick the copper sheet with cable to the bottom

Fill the container with stainless steel balls

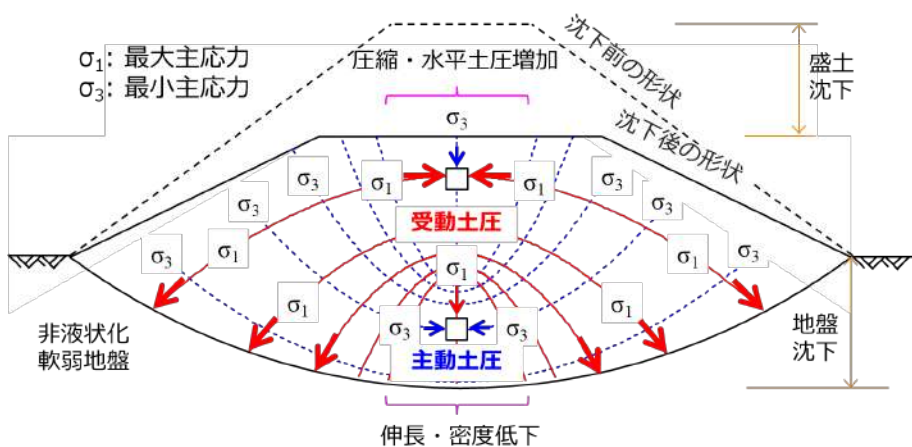
Inject resin and encapsulate with copper sheet



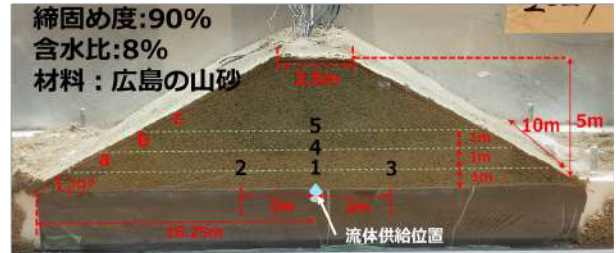
Recent thesis supervision (修士)

M2 村井 佑次

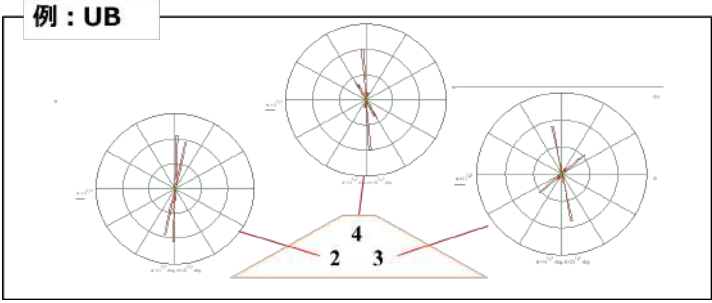
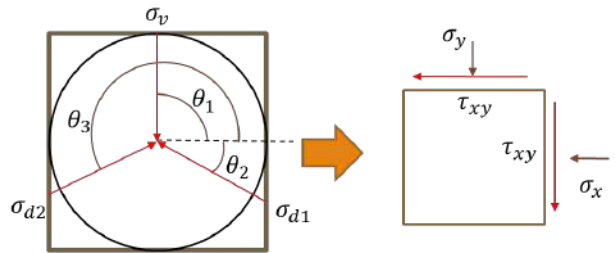
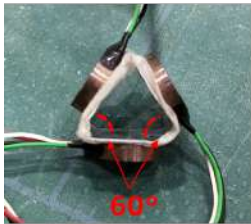
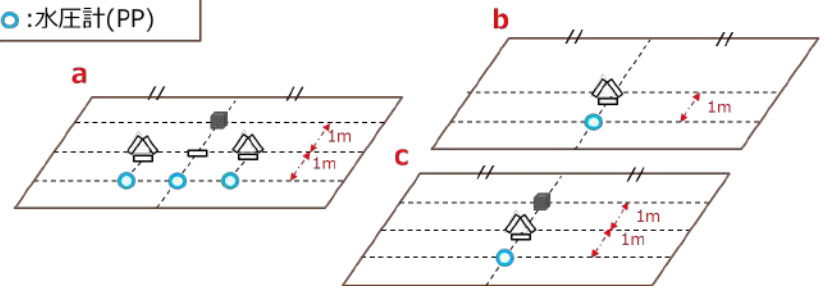
多方向応力測定を用いたアーチ作用を受けた盛土の地震時動的挙動



地盤条件
 ウレタン(UB)
 穴あきウレタン(UBH)



- : 加速度計 (ACC)
- : 土圧計 (EP)
- : 水圧計 (PP)



Recent thesis supervision (修士)

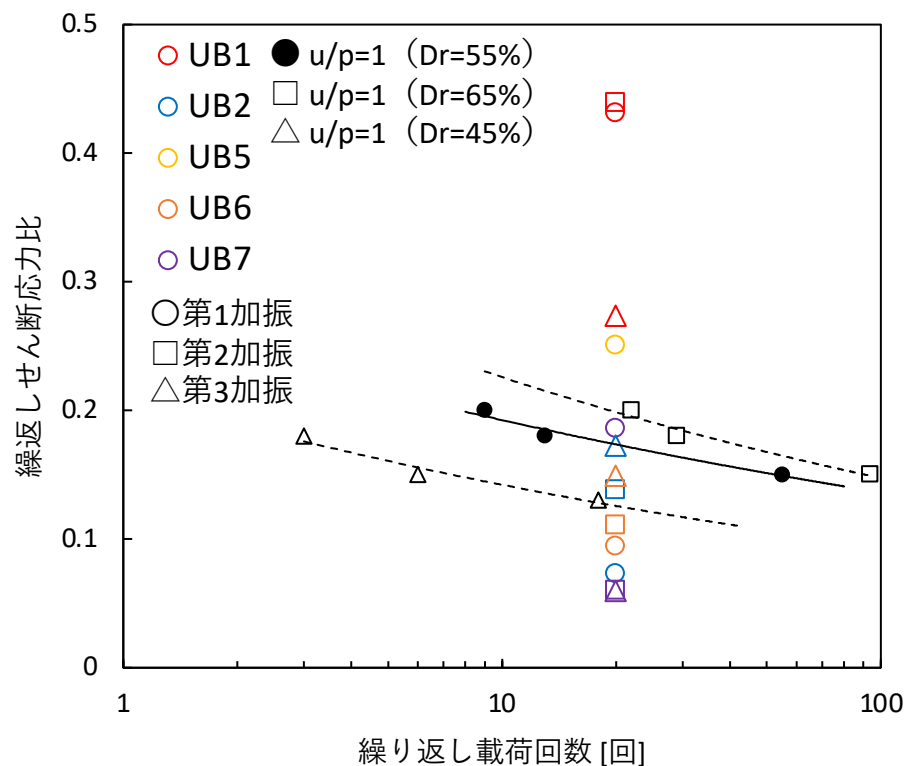
M2 平川 翔也

軟弱地盤上の河川堤防内の液状化抵抗と破壊条件



三軸試験機

・繰返しせん断応力比 < 0.5



Recent thesis supervision (修士)

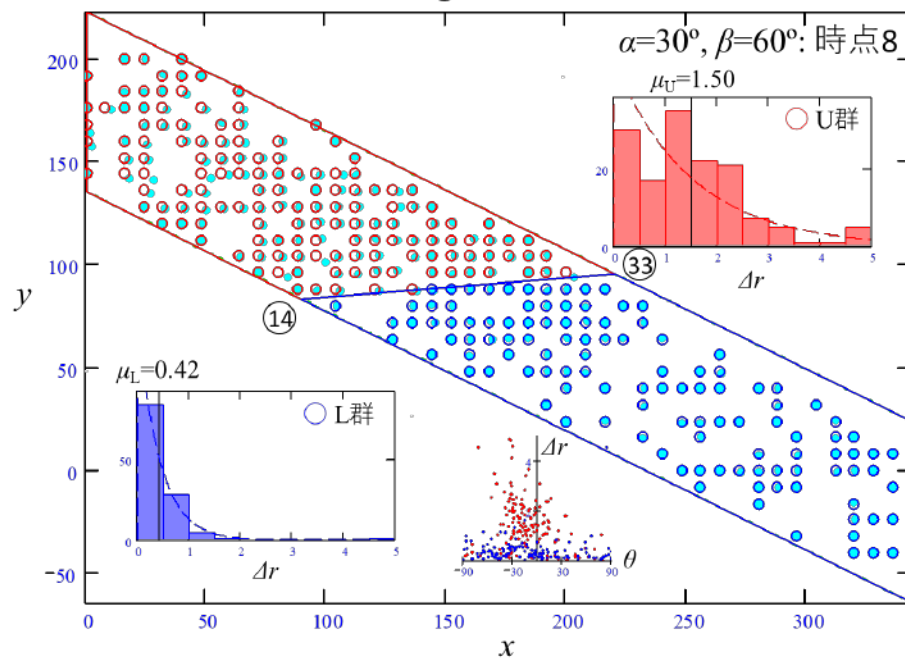
M2 吉田 伊織

斜面脚部付近でのすべり面形成による斜面破壊の起因

物理模型実験



最大の統計量 t_s (Studentの t 検定)

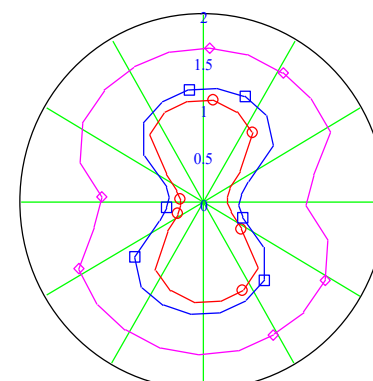
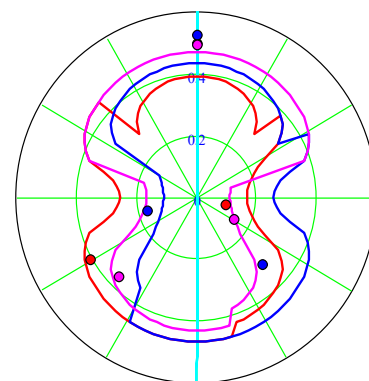
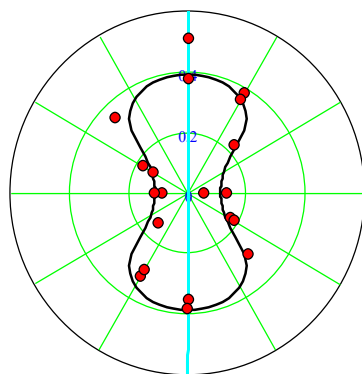
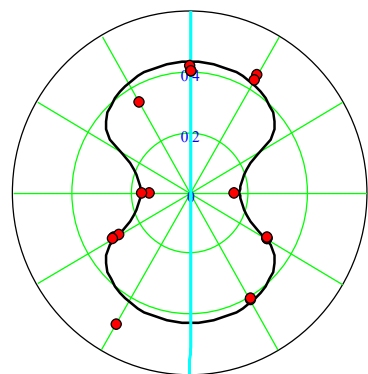
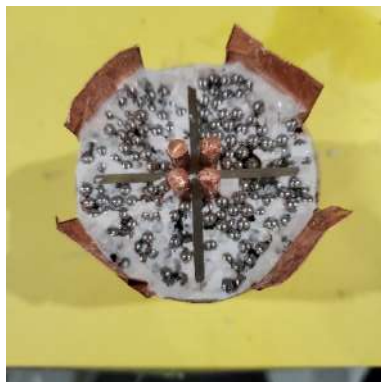


Recent thesis supervision (修士)

M2 間宮 基貴

感圧導電性粒子を用いた応力成分測定法の開発

円筒型の供試体



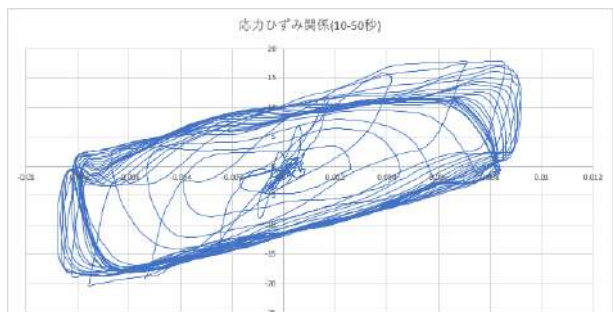
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キャリブレーション結果

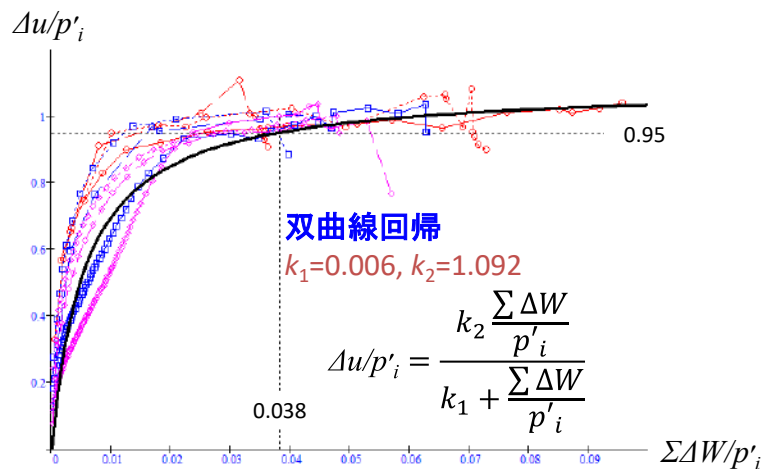
Recent thesis supervision (学士)

B4 上本 貴央

盛土内部の耐液状化性能に着目した応力・ひずみ関係に関する実験的検討



基準化損失エネルギーに対する過剰間隙水圧率

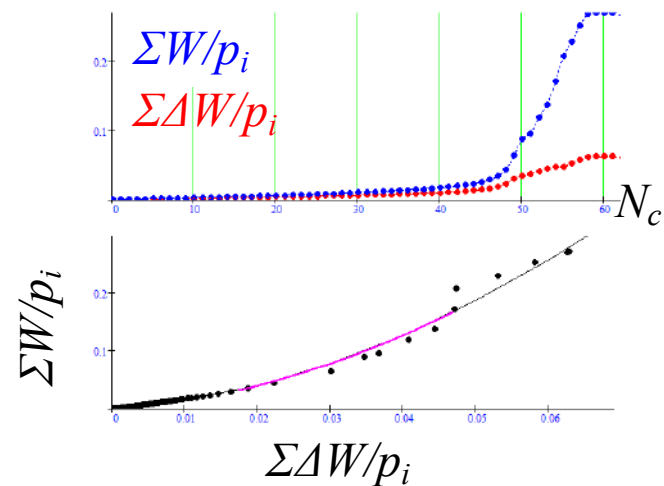
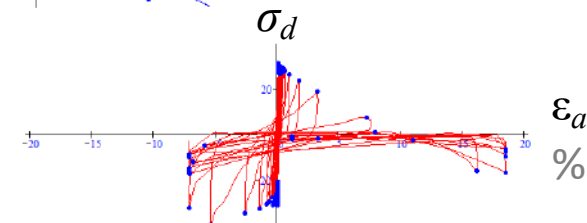
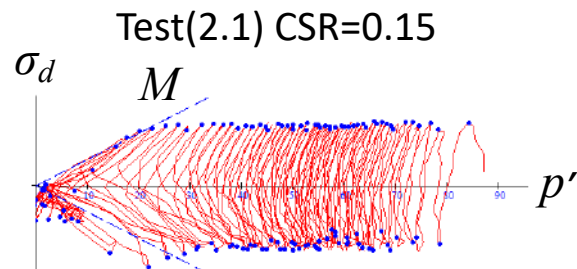


データ数: 278点

○: $D_r=45\%$ (CSR=0.13, 0.15, 0.18)

□: $D_r=55\%$ (CSR=0.15, 0.18, 0.20)

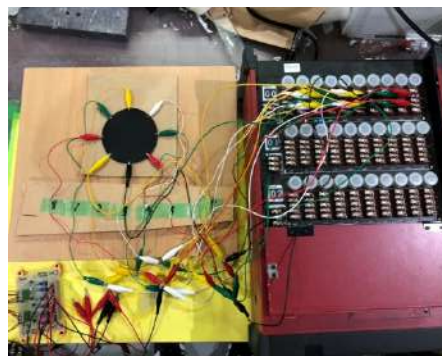
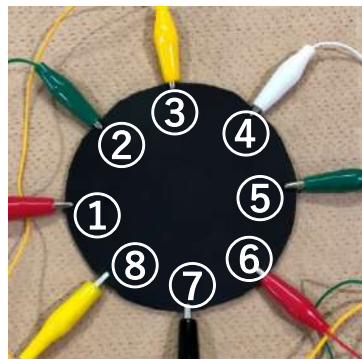
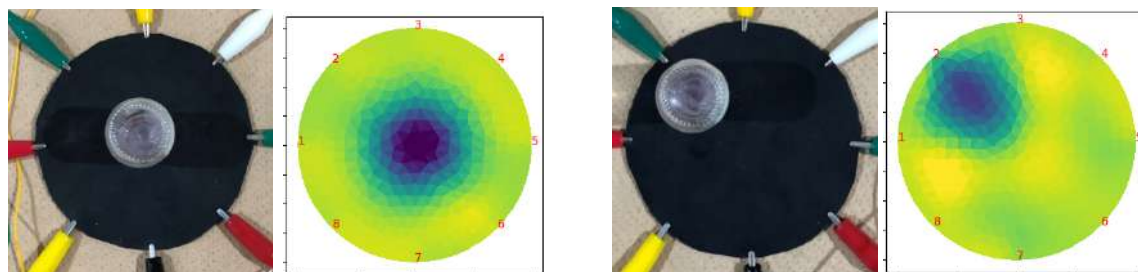
◇: $D_r=65\%$ (CSR=0.15, 0.18, 0.20)



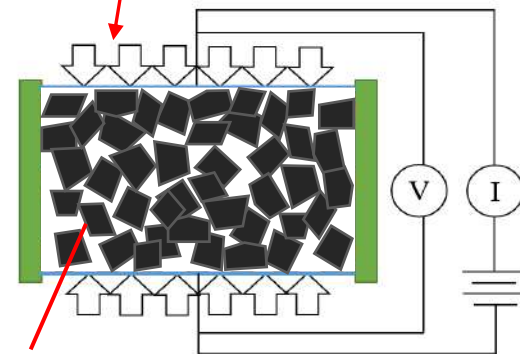
Recent thesis supervision (学士)

B4 筒井 爽人

導電材料の電気接触抵抗およびトモグラフィーに基づく応力測定法の考察



円形導電性ゴムへの载荷実験



破碎活性炭