JOURNAL OF ZHEJIANG UNIVERSITY SCIENCE ABC

An efficient parameter identification procedure for soft sensitive clays

Liang YE[1], Yin-Fu JIN[2,*], Shui-Long SHEN[3], Ping-ping SUN[4], Cheng ZHOU[5]

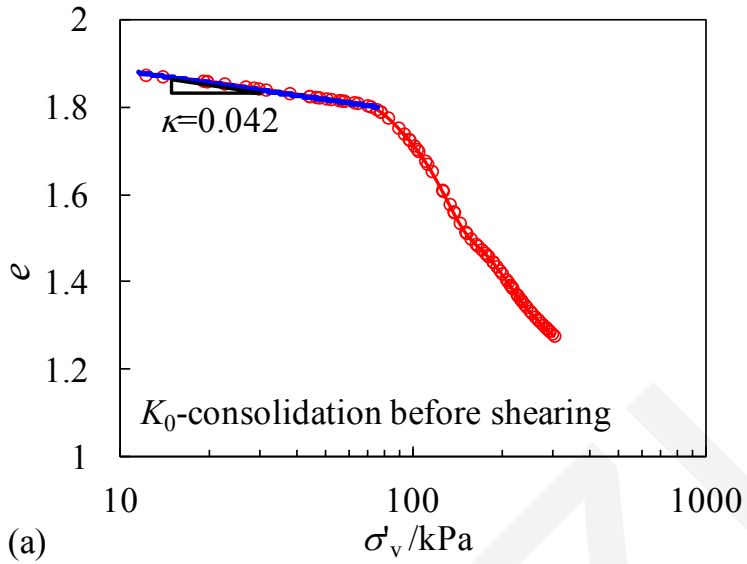
[1] Associate Professor, Department of Civil Engineering, Zhejiang University of Science and Technology, Hangzhou 310012, China, Email: yeliang88@126.com

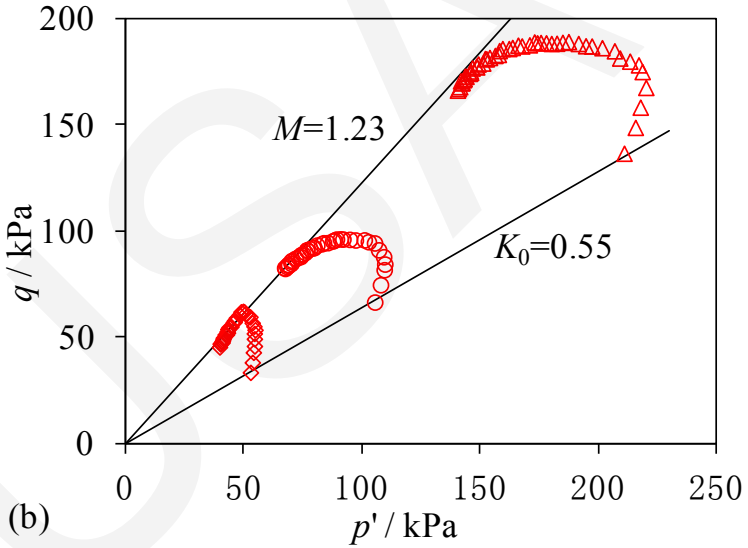
[2] PhD Candidate, State Key Laboratory of Ocean Engineering, School of Naval Architecture, Ocean, and Civil Engineering, Shanghai Jiao Tong University, Shanghai 200240, China and LUNAM University, Ecole Centrale de Nantes, GeM UMR CNRS, 6183, Nantes, France. Email: yinfu.jin9019@gmail.com

Cite this as: L. YE, Y.-F. JIN, S.-L. SHEN, P.-P. SUN, and C. ZHOU, 2016. An efficient parameter identification procedure for soft sensitive clays. *Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)*, 17(1):37-44. [doi:10.1631/jzus.A1500031]

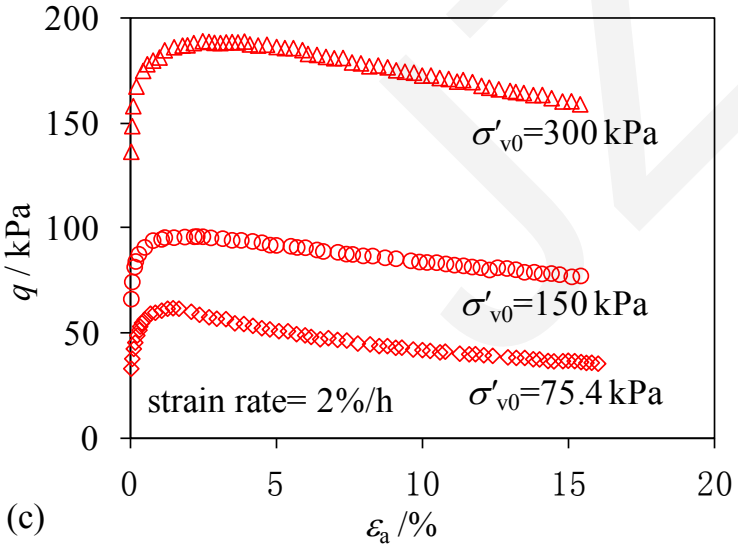
Difficulties of measing parameters

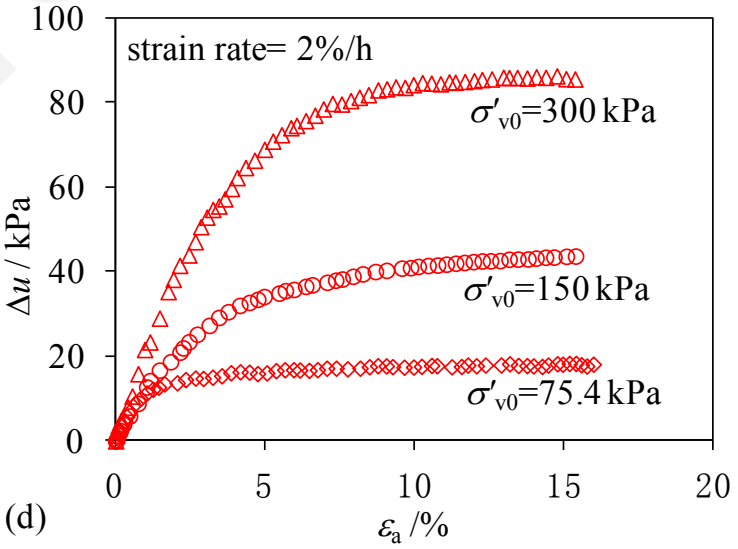
Typical laboratory tests of clay





e_0, κ
λ, M
…





C_{ae}?
S_t?
…

Related parameters

Parameters

$$\dot{\varepsilon}_v^{vp} = \frac{C_{\alpha e}}{(1+e_0)\tau}\left(\frac{\sigma'_v}{\sigma'_p}\right)^{\frac{\lambda-\kappa}{C_{\alpha e}}}$$

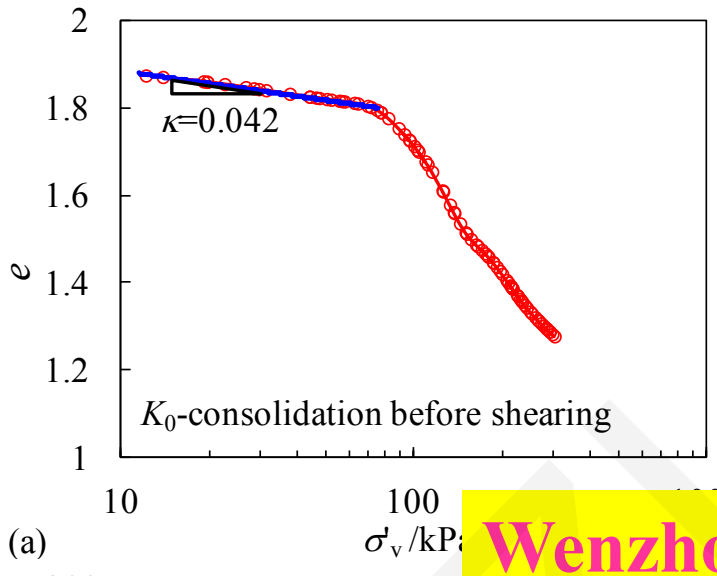
- **Parameters**
  - **Creep related**
    - C_{ae}
  - **Destructuration related**
    - χ_0
    - ξ, ξ_d

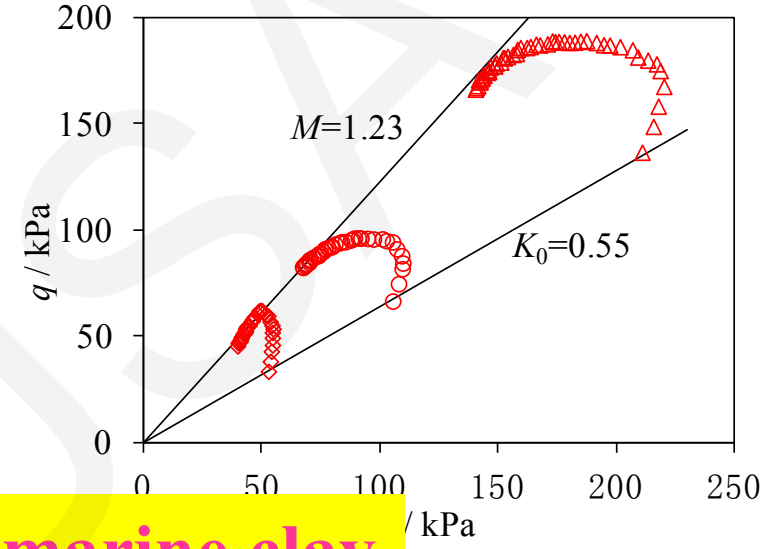
Bonding: $\sigma'^{r}_{p} = (1+\chi)\sigma'^{r}_{pi}$

Debonding: $\chi = \chi_0 \exp\left[-\left(\xi\varepsilon_v^{vp} + \xi_d\varepsilon_d^{vp}\right)\right]$

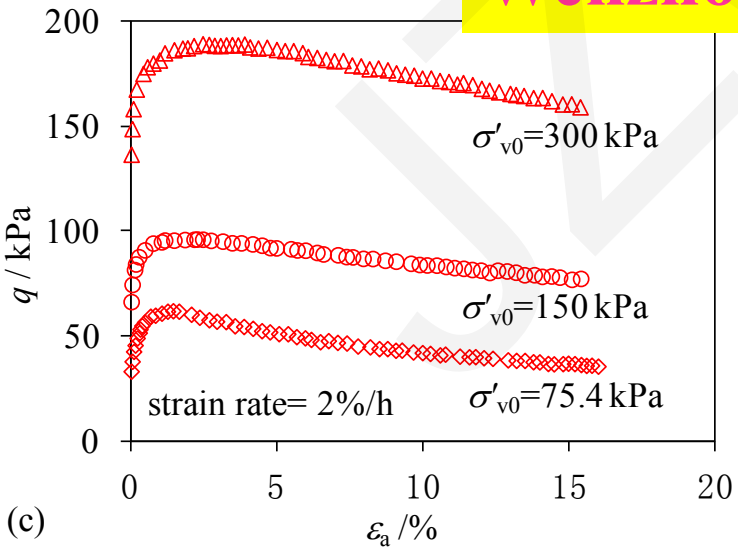
Related Parameters

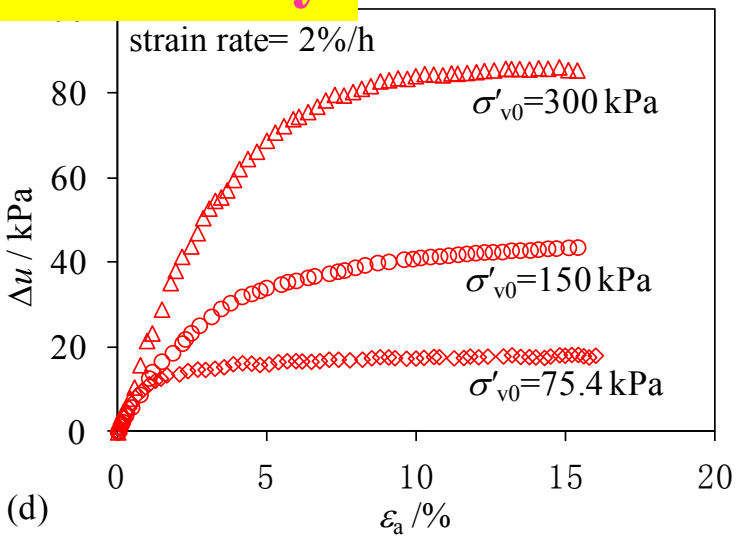
Objective tests





Wenzhou marine clay





Related Parameters

Adopted constitutive model

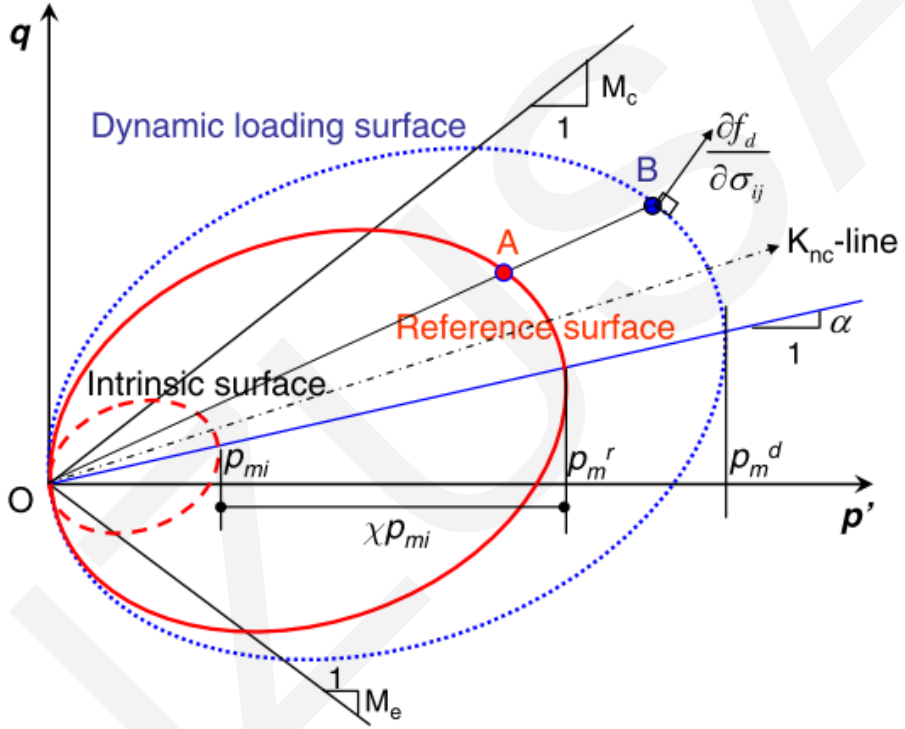
Modeling

Zhen-Yu Yin[1]; I

Abstract: The paper fo
various oedometer tests
experimental observatior
model accounts for inhe
parameters is discussed,
for the proposed model
coupled consolidation ar
ditions on the intact sam
predictive ability on the t
Society of Civil Enginee

CE Database subject

Author keywords: An



sitive Clay

d Matti Lojander[5]

evolution. For this purpose,
were carried out. Based on
s developed. The proposed
he determination of model
no additional test is needed
ement code, which enables
nensional and triaxial con-
ow that the model has good
0000527. © *2011 American*

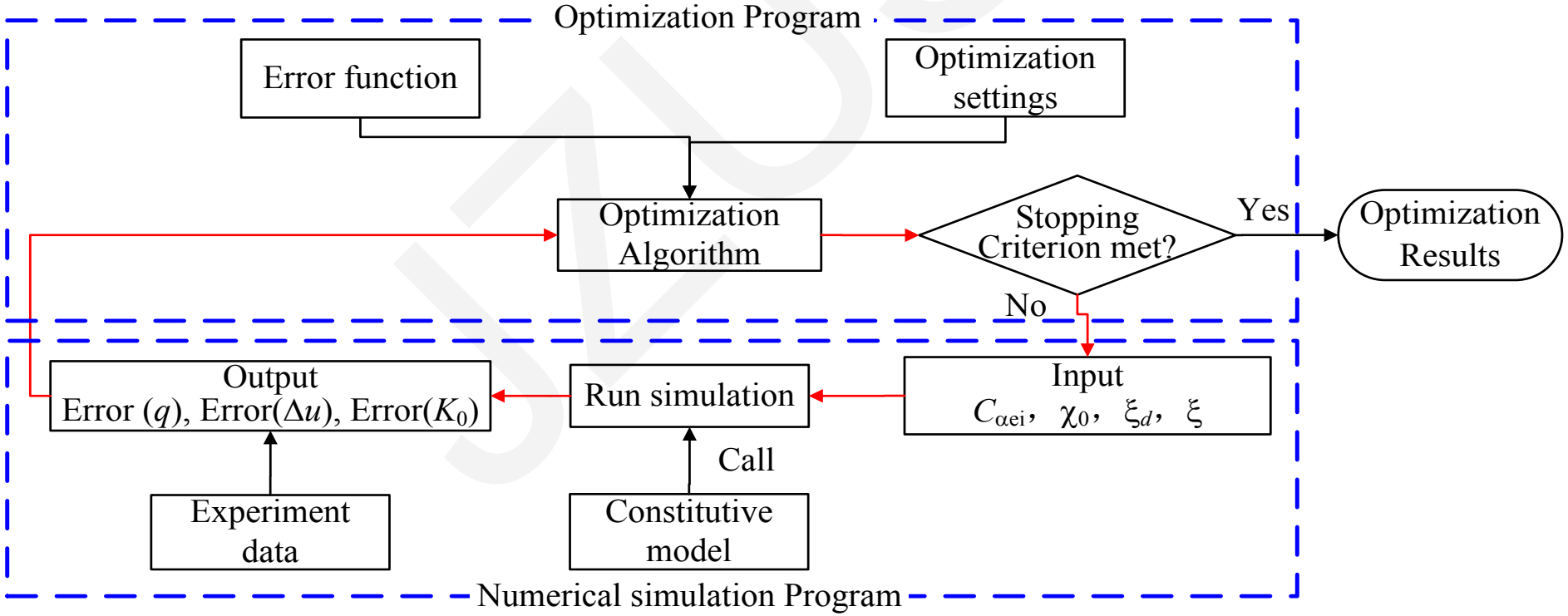
ANICREEP Model developed by Yin et al. 2011

Optimization Procedure

Procedure

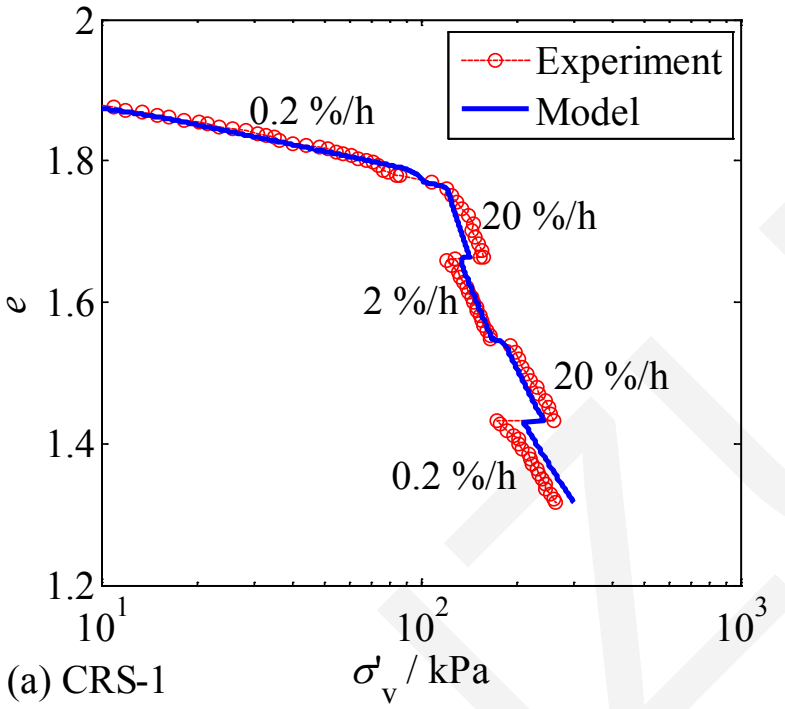
Mono-objective

$$\min\left[\text{Error}(x)\right] = \min\left[\frac{\text{Error}(K_0) + \text{Error}(q) + \text{Error}(\Delta u)}{3}\right]$$

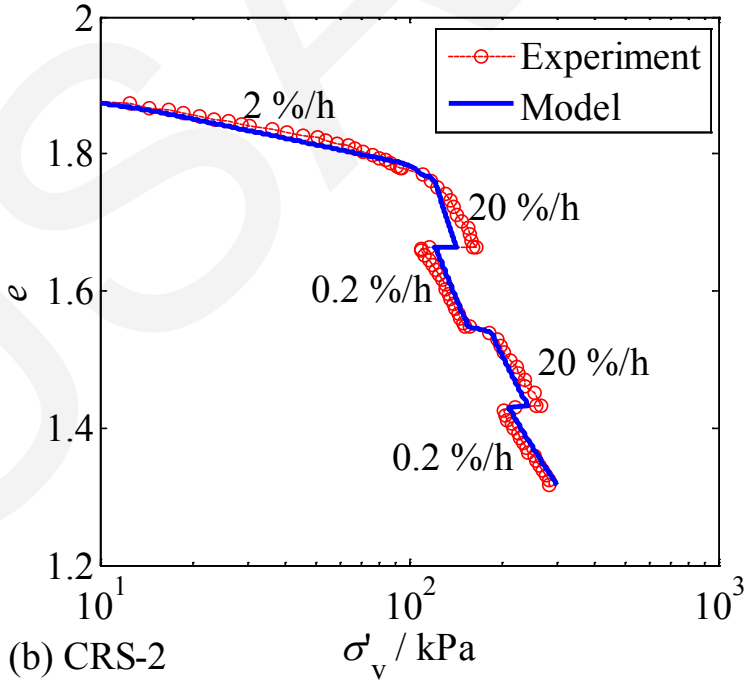


Validation

Validation based on simulations of other tests



(a) CRS-1

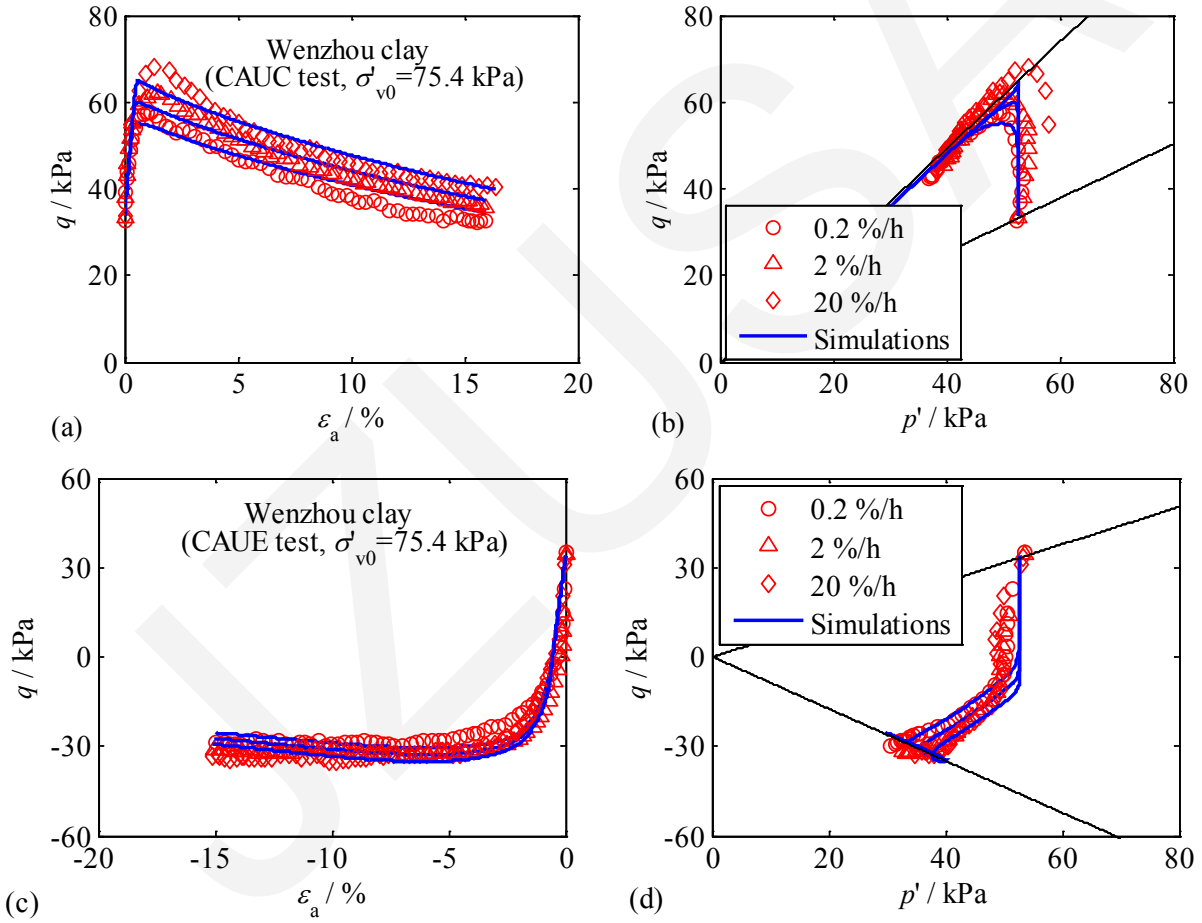


(b) CRS-2

1D CRS tests

Validation

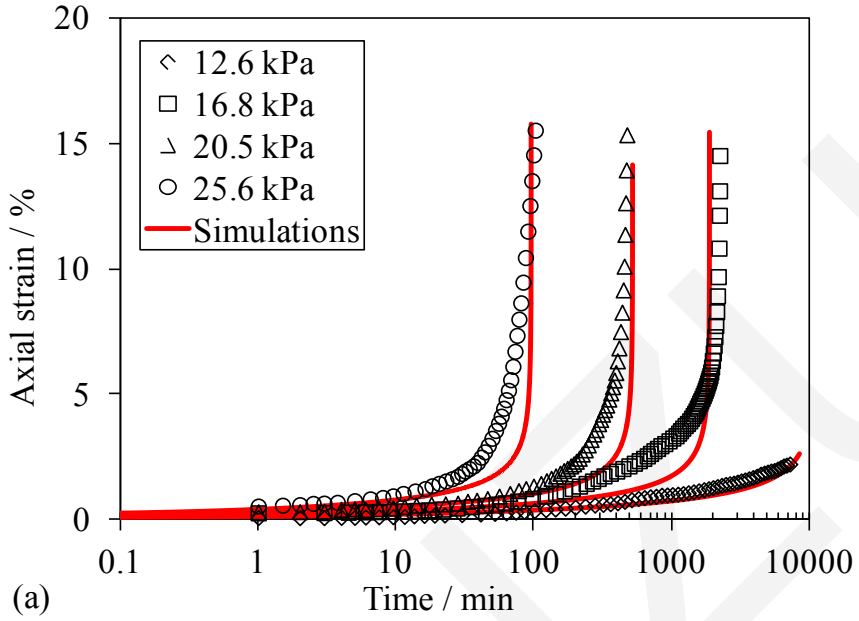
Validation based on simulations of other tests

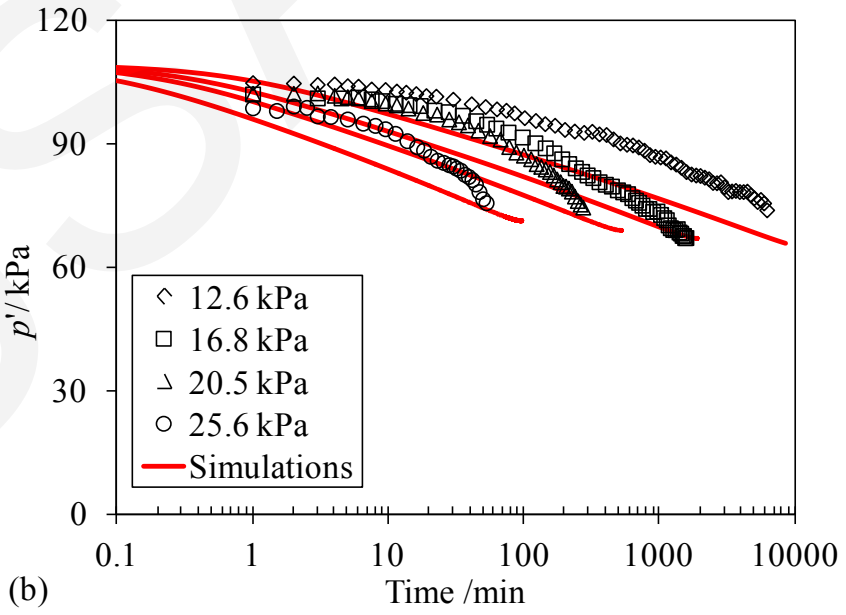


3D CRS tests: Compression and extension (σ'_{v0}=75.4 kPa)

Validation

Validation based on simulations of other tests





3D Creep tests

Conclusions

- An efficient optimization procedure for identifying creep and destructuration related soil parameters using standard experimental tests has been proposed.

- Future work may include the application of the advanced optimization methods, combined with advanced constitutive models, to field tests or measurements.